

MODEL AIRPLANE NEWS

12th Year of Publication

JUNE 1941

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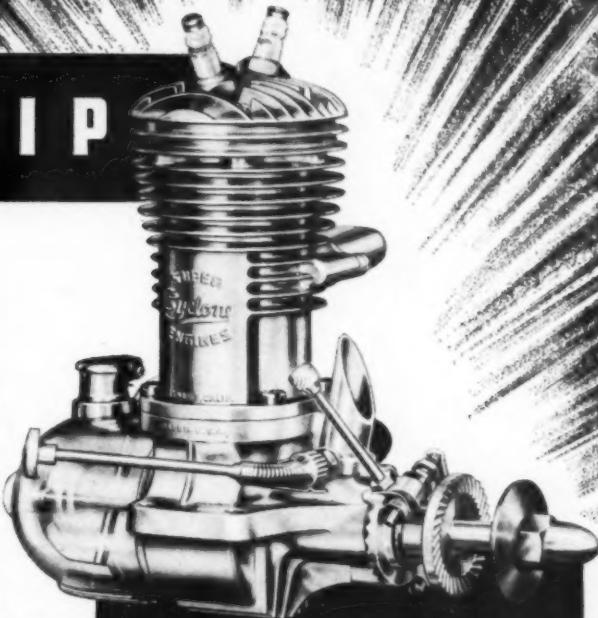
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PROP WASH

HAVE YOU LOOKED at a modern airplane? Have you followed from year to year the evolution of its lines? All of man's industrial efforts, all his computations and calculations, all his working draughts and blueprints, invariably culminate in the production of a thing whose sole and guiding principle is the ultimate principle of simplicity.

IT IS AS IF there were a natural law which ordained that to achieve this end, to refine a ship's keel, or the fuselage of an airplane, until gradually it partakes of the elementary purity of the curve of a human shoulder, there must be the experimentation of generations of craftsmen. Perfection is finally attained not when there is no longer anything to add, but when there is no longer anything to take away.

IT RESULTS FROM this that perfection of invention touches hands with absence of invention, as if that line had not been invented but simply discovered, had in the beginning been hidden by nature and in the end been found by the engineer.

ENGINEERS, PHYSICISTS concerned with thermodynamics, and the swarm of preoccupied draughtsmen, in appearance seem to be polishing surfaces and refining away angles, easing this joint or stabilizing that wing, rendering these parts invisible, so that in the end there is no longer a wing hooked to a framework but a form flawless in its perfection, a sort of spontaneous whole, its parts mysteriously fused together and resembling in their unity a poem.

THERE WAS A time when a flyer sat at the centre of a complicated works. Flight set factory problems. The indicators that oscillated on the instrument panel warned of a thousand dangers. But in the machine of today we forget that motors are whirring: the motor, finally, has come to fulfill its function, which is to whirr as a heart beats—and we give no thought to the beating of our heart. Thus, precisely because it is perfect the machine dissembles its own existence instead of forcing itself upon our notice . . .

AIR AND WATER, and not machinery, are the concern of the hydroplane pilot about to take off. The motors are running free and the plane is already ploughing the surface of the sea. Under the dizzying whirl of the scythe-like propellers, clusters of silvery water bloom and drown the flotation gear. The element smacks the sides of the hull and the pilot can sense this tumult in the quivering of his body. He feels the ship charging itself with power; a development in these fifteen tons of matter, of a maturity that is about to make flight possible. He closes his hands over the controls, and little by little in his bare palms he receives the gift of this power. And when this power is ripe, then, in a gesture gentler than the culling of a flower, the pilot severs the ship from the water and establishes it in the air.

From WIND, SAND AND STARS by Antoine DeSaint Exupéry—courtesy of Reynal & Hitchcock, Inc., N.Y.C.

—THE EDITOR

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JUNE, 1941

VOL. XXIV, No. 6

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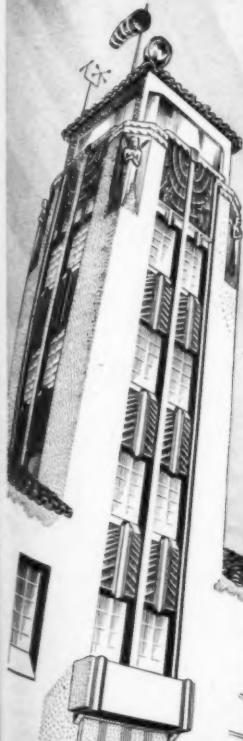
Edited by
Charles Hampson Grant

Published monthly by Jay Publishing Corp., Mt. Morris, Illinois. Editorial and advertising offices: 551 Fifth Ave., New York, N.Y. George C. Johnson, President; Jay P. Cleveland, Advertising Manager. Entered as second class matter Dec. 6, 1934 at the post office at Mt. Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N.Y. Price 26c per copy. Subscriptions \$2 per year in the United States and possessions; also Canada, Cuba, Mexico, Panama and South America. All other countries \$2.50 per year. Copyright 1941 by Jay Publishing Corp.

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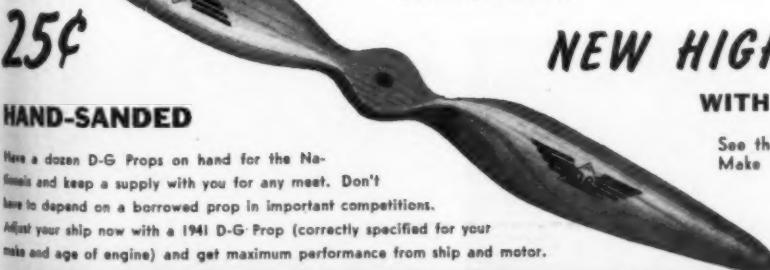
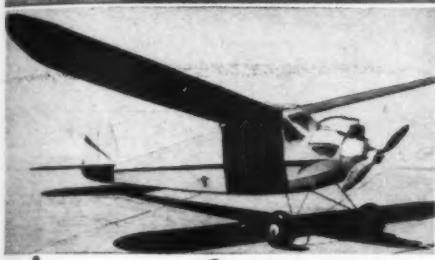
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(Name of writer on request)



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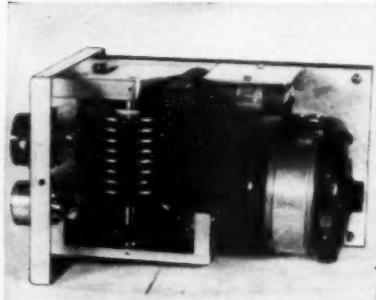
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THE ARMY FLIES 'BLIND'

MUCH has been written concerning the personal equation during flight and the influence of this equation on accident rates. The newer developments in modern aircraft, to insure higher performance, have required an increasing number of cockpit devices, all of which demand the attention of the pilot at some time or other during any given flight. In no uncertain terms, pilots have felt and expressed the need for simplification of the various controls that must be manipulated. This simplification means that many of the functions now performed by the pilot in flight control and



Automatic flight equipment in Fokker airplane

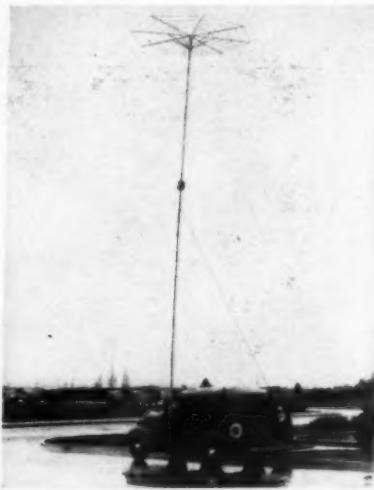


Frequency selector (internal view)

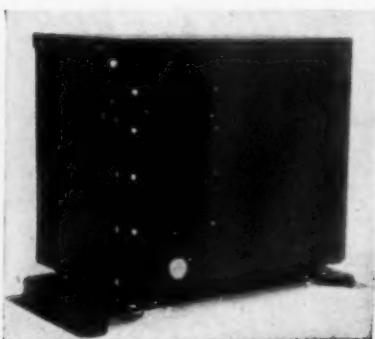
How a Complete Set of Instruments Have Been Developed for Automatic Flying and Landing Without the Pilot's Guiding Hand

navigation must be done automatically; the landing of aircraft is no exception to this general trend. With this in mind, the personnel of the Materiel Division at Wright Field, Dayton, Ohio, over two years ago began active prosecution of development work to simplify the procedure of instrument landing by making it automatic.

For over a year U. S. Army Air Corps test airplanes have been flown automatically over distances that have indicated the thorough reliability of the devices employed. This was one step in the perfection of automatic landing. The features therefore that are built into the automatic landing system are not only useful for landing but are used throughout the airplane's entire flight across



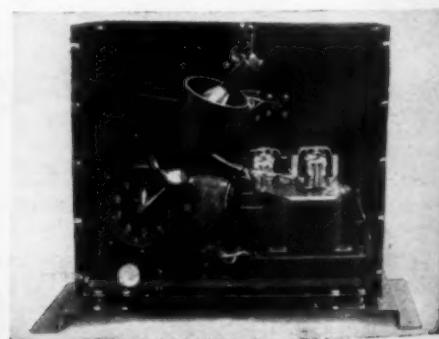
Instrument landing truck and antenna mast



Minimum altitude control



Frequency selector (external view)



Minimum altitude control (cover removed)

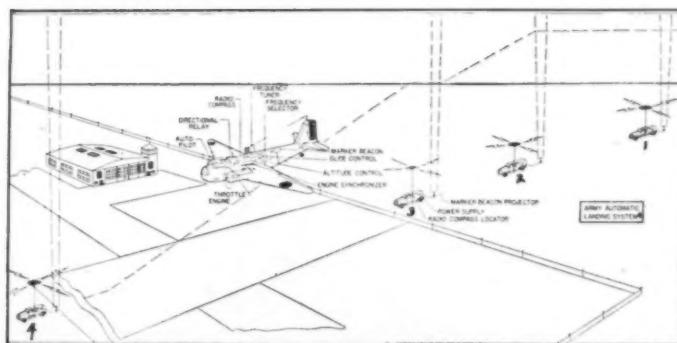
Model Airplane News - June 1941

Capt. Holloman, Maj. Crane and automatic landing airplane



when the flaps are lowered to any predetermined desired angle, the propeller in low pitch, the landing gear extended, the throttle retarded until a minimum safe cruising speed is obtained and with a zero rate of descent. The second condition is the glide, more commonly known as the "let down." The "let down" may be any predetermined constant rate of descent, or a path in a vertical plane furnished by a radio glide beam. This desired rate of descent is accomplished by further retarding the throttle. During the let down the airplane must be held in a safe landing position in that it is impossible to know at exactly what moment it will make contact with the ground. To accomplish this, certain conditions must be met. The pitch attitude of the airplane must be level; in other words, the longitudinal axis must be held parallel to the earth's surface. During the let down the position of the flaps and landing gear and pitch of the propeller should remain the same as during slow cruise.

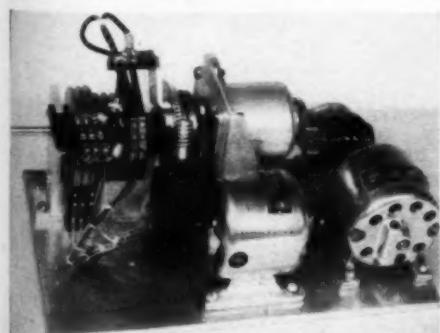
It is reasonable to assume that the values for the two above-mentioned conditions could be easily determined for all types of aircraft, if it were possible to obtain values that would remain reasonably constant regardless of type of airplane and, at the same time, provide a sufficient margin of safety in flight control. Through flight tests conducted at the Materiel Division on a great



U.S. Army Corps automatic landing system



Instrument panel and control board in cockpit of automatic flying airplane



Engine with solenoid-operated throttle



Photometric cell rate-of-climb indicator



Landing gear switch

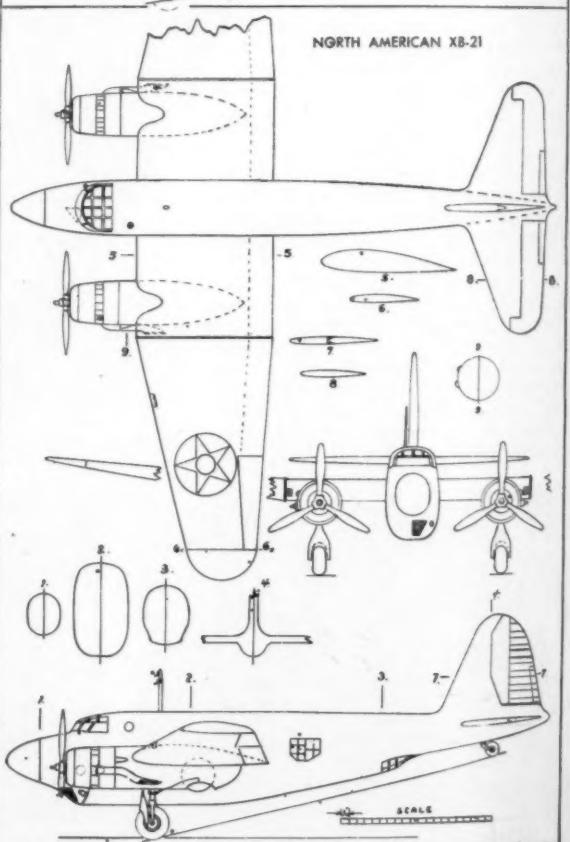
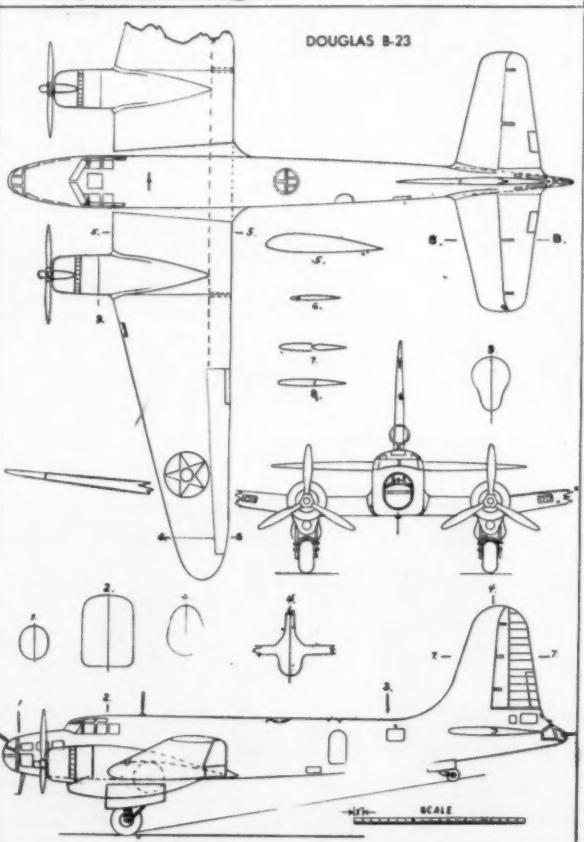
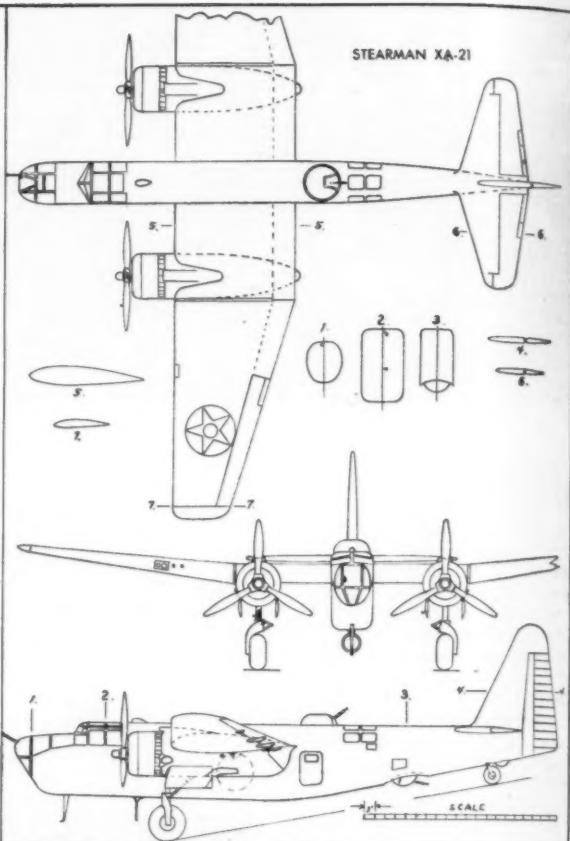
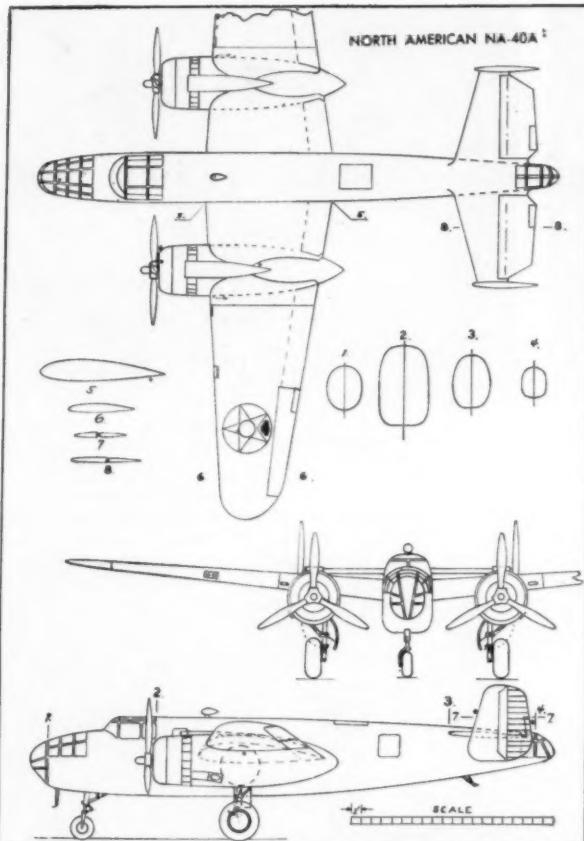




Fig. 2. Variable frequency transmitter ready for operation

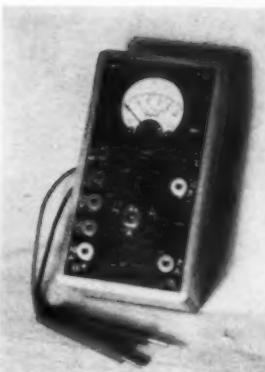
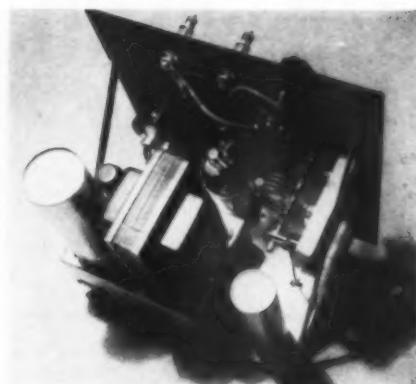


Fig. 5. A test meter designed especially for radio control experimenters



Few parts are needed to produce good power output

By HOWARD G. McENTEE

AS IS probably evident to those who have followed this series, the writer is an advocate of stabilized, or fixed, frequency transmitters for radio control. Use of a crystal in this work has been covered in several transmitters described in the past.

A bit more flexibility can be had with crystal control by using several crystals and a simple switching means with a single tube line-up. Although only one frequency can be transmitted at a time; such an arrangement allows several receivers, each tuned to a different frequency, to be operated from a single transmitter. It has been found that the transmitter circuits need not be retuned if the various crystals cover a spread of no more than about 300 kc. This allows sufficient frequency separation for reliable operation of three

receivers spaced 100 kc. apart, and even more have been used experimentally. The transmitter tuned circuits should always be set to the mean frequency and will then be found to cover those at either end of the range reasonably well. The antenna also should be cut for an intermediate point in the range to be covered. There will, of course, be a certain loss when the

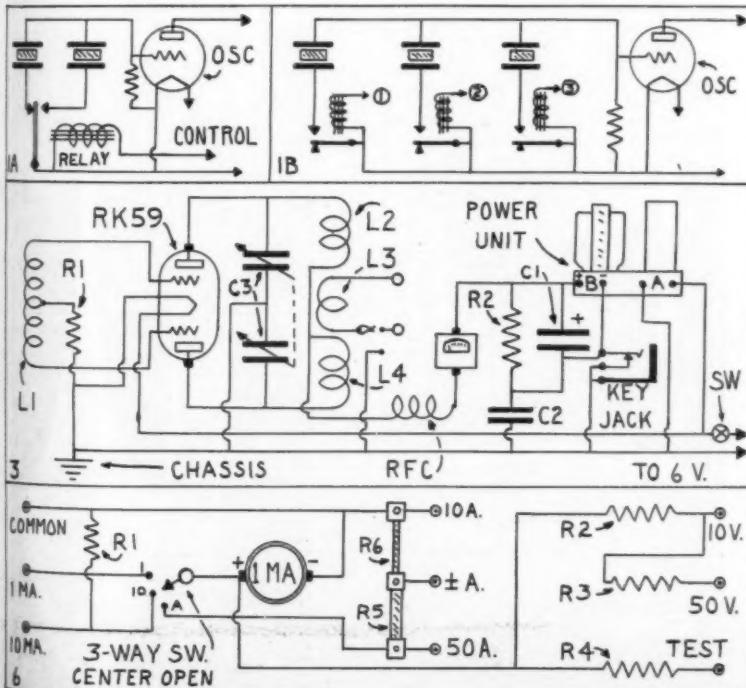


Fig. 1, 3, 6. Circuits described fully in text

ELEMENTS OF RADIO CONTROL

PART 6

A Simple Transmitter for Model Plane Radio Control

transmitter is operated at a frequency for which it is not exactly tuned, but the drop in output is surprisingly low.

When the transmitter itself carries the control switches, a simple SPDT switch can be used for shifting crystals. Many operators, however, have a control box connected by a length of cable to the transmitter itself, in which case relays must be used for crystal shifting as the actual R.F. leads in the circuit must be kept as short as possible.

Even so very little complication will result. For two crystals a single relay will suffice as seen in Fig. 1 A. When three or more are used a separate relay for each is best to avoid circuit complications, the arrangement then appearing as in Fig. 1 B. As pointed out before, the leads between crystals, relays and oscillator tubes must be as short as possible, but of course the relay operating circuits may be extended to any practical length.

Several correspondents have expressed a desire for a highly flexible transmitter and one that is simple and self-contained as well. This means only one thing: a simple self-controlled oscillator, and such a rig is shown herewith, Fig. 2, to give an idea of what can be accomplished along such lines. The circuit is the simplest of all, the TNT, similar to that used in the baby transmitter described in a previous issue. A dual type tube, the RK59, is em-

(Continued on page 32)

THE AERO FORUM

What Do You Think?

From time to time many readers wish to discuss their problems with one another, but find it difficult to communicate with modelers in the thousands of distant communities.

Consequently, MODEL AIRPLANE NEWS is coming to their aid and is establishing this new column, "The Aero Forum." It will be dedicated to setting forth ideas, comments, criticisms (and answers to them) from readers. On particular questions where comments from the editor are requested they will be given; otherwise this space will be dedicated to "reader debates."

We look forward to having readers take advantage of this; sending material they wish to appear here. In doing so address your letters to: Aero Forum, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

A rather interesting letter comes from Mr. Ernest Walton, 50 W. 50 Street, New York City, who takes exception to a number of ideas expressed in previous issues. He says:

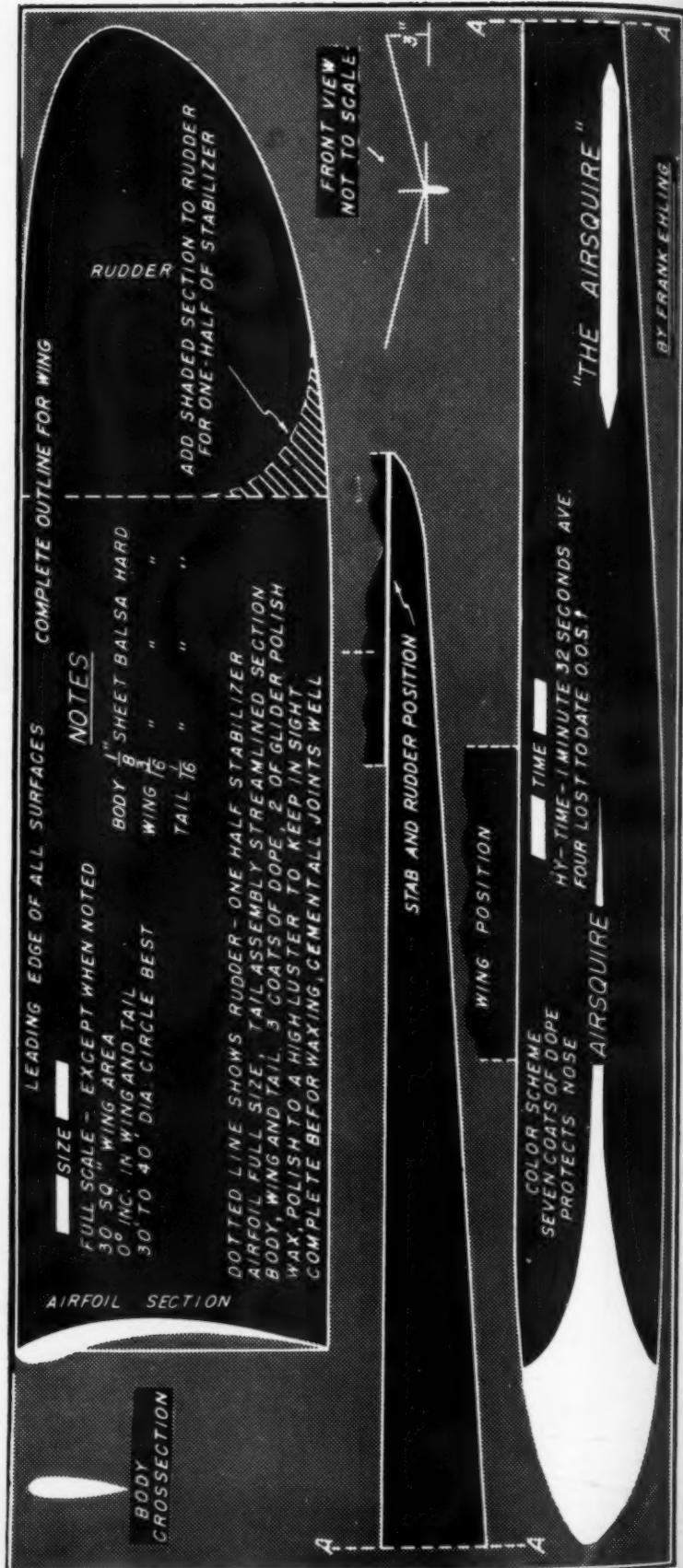
"I noticed two articles especially which contained some misleading statements. The first is the article 'Lifting or Non-Lifting Tails,' by G. H. Tweeny. Mr. Tweeny states that it is desirable to have the plane fly at its best L/D or at its best 'efficiency.' It can be easily shown that it is more desirable to have the plane fly at its minimum power consumption or at the least value of C_d/C_l^2 . Furthermore the term efficiency, technically speaking at least, is rather vague in this connection.

"There is also a discussion of the 'neutral' tail in which the author asserts that the tail, being a flat plate, there is no force produced on the tail; consequently the c.p. and c.g. must coincide, and goes on to state that this type of tail is used on large scale airplanes.

"This is a rather gross misstatement. The static stability of such an airplane, dynamic stability being completely missing, would be catastrophic on any airplane. The author apparently is unaware of the fact that the air leaves the wing depressed at an angle (called the angle of down-wash) thus setting the horizontal tail at a definite aerodynamic angle of attack even though its geometrical angle may be zero. For this reason, incidentally, the flat plate sections carry a download counterbalancing the pitching moment.

"The second error I found was in the May issue in the article 'Model Design Simplified' by C. H. Grant. This article states on page 69 that the c.g. on a parasol plane, being located below c.p., would set up a restoring moment if the plane is disturbed from its normal position. This was described as a 'Pendulum Effect.' However all axes of an airplane are drawn through the c.g. and hence the c.g. is

(Continued on page 72)



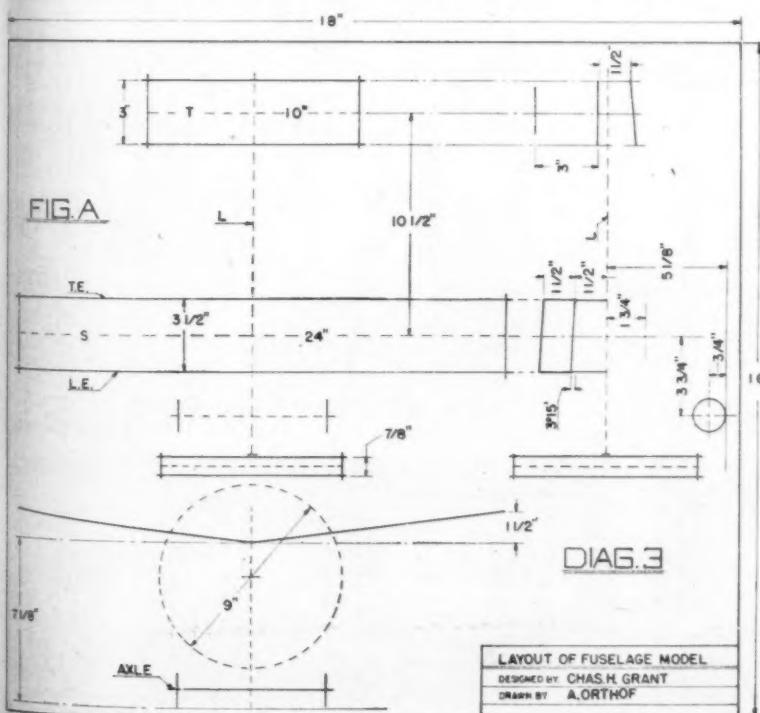
MODEL DESIGNING SIMPLIFIED

Making the Layout of Your First Fuselage Model to Conform to Design Requirements

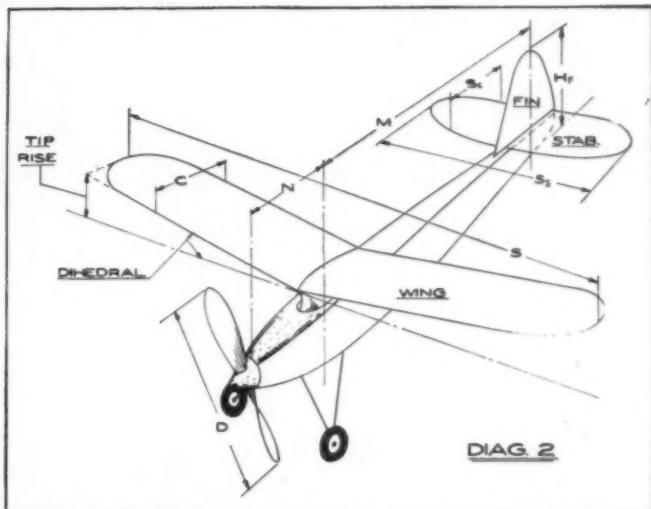
By CHARLES HAMPSON GRANT

IN THE preceding article of this series the proportions and measurements were established for the model fans first fuselage model. In order that the designer and builder may complete and fly it successfully, it was necessary to make it of the simplest design and construction. It is suggested that the reader examine the article in the previous issue to familiarize himself with the project in hand. All aerodynamic factors were established except two, namely, stabilizer angle of incidence and wing angle of incidence, both of which are measured relative to the thrust line. The angle of incidence of any surface is the angle between the chord and the thrust line (the chord is a straight line running from the leading to the trailing edge of an air foil).

The stabilizer angle should be determined first and is established by a simple rule.



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Model Airplane News - June 1941



ARTICLE 7

It is dependent upon the height of the wing chord above the thrust line and the length of the moment arm. The following formula gives its value:

$$Sa = \frac{9H}{M}$$

H represents the distance from the thrust line to the wing chord. In this case $1\frac{1}{2}$ ". M is the stabilizer moment arm, here $10\frac{1}{2}$ ". By substituting these values for H and M in the formula and solving the stabilizer angle will be 1.28° or practically $1\frac{1}{4}^\circ$. The wing angle of incidence should always be 2° more than the stabilizer angle, thus in this case it will be $3\frac{1}{4}^\circ$ relative to the thrust line. All the aerodynamic val-

ues of the plane have now been determined.

The next step is to lay out a three-view drawing of the model on the drawing board. You may wish to make it full-scale. However, this usually requires a very large sheet of paper which is not always convenient. Therefore, it is suggested that the drawing be made half-scale. The size of the paper may be determined from the wing span. For a full-scale drawing, the height between border lines should be 1.33 times the span, plus two inches for border, or 34". The width should be $1\frac{1}{2}$ times the span, plus 2 inches, or 36". For a half-scale drawing, the measurements between border lines should be half the full scale distances, namely, 15" high and 18" wide. The plan view should be made first. The side view second, and the front view last.

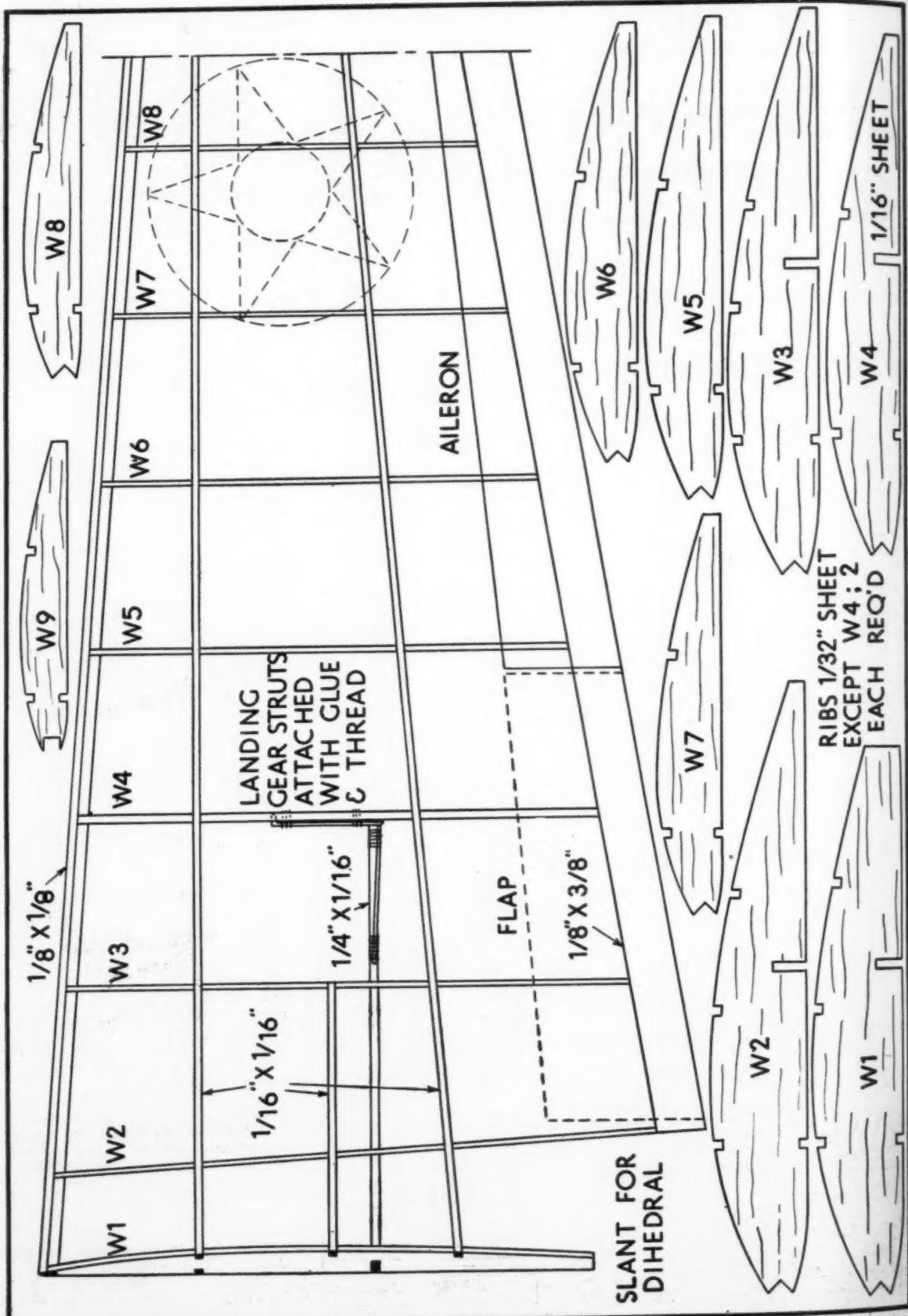
Place the top or plan view Fig. A, in the upper left hand corner. The longitudinal axis, or axis of the body of the plane, will be vertical on the paper. The axis of the wing will run horizontally. In laying out the drawing, the various steps should be taken in order as follows:

1. Draw a horizontal line S representing the lateral axis of the plane, approximately 7" from the top border line of the drawing. This will be the center line of the wing and should be at least 12" long. Then $\frac{1}{2}$ " in from the left border draw a line perpendicular to this wing axis.

2. 12" to the right of this line draw another vertical line perpendicular to the axis. These two verticals represent the wing tips. The span being 24" and the drawing made to half-scale, the distance between them will be 12".

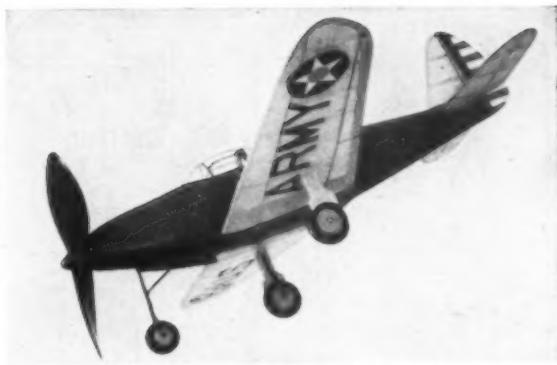
3. The chord of the wing is to be $3\frac{1}{2}$ " therefore horizontal lines should be drawn $\frac{7}{8}$ " above and below the lateral axis or center line of the wing. These two lines represent the wing leading and trailing edges and should run between the two verticals representing the wing ends—see Diagram No. 3. All these lines should be made fairly light until the final details of the plane have been established then they should be drawn in heavy.

4. Draw in the longitudinal axis L. This should be vertical to the wing center
(Continued on page 48)





A fine performer with the sleek lines of the large plane



The large propeller insures long flights

THE AIRACOBRA TAKES WING

Build This Flying Replica of the World's Fastest Pursuit Plane—The Bell P-39

LARRY BELL'S "Airacobra," latest and most sensational of the U.S. Army pursuits, is one of the swiftest and deadliest fighters ever to take to the air. With exceptional speed, unusual maneuverability and impressive fire-power, it should outperform and out-fight any of the war planes in current production.

Most prominent of the many unusual features of the P-39, as it is designated by the U.S. Army Air Corps, are the tricycle landing gear and location of the engine behind the pilot's cockpit. Use of the three-wheel retractable under-carriage allows the ship to make use of small airports, which is an important factor in war-time operations. The Allison engine of 1090 horsepower is located in the middle of the fuselage, at the position of the center of gravity, and the propeller is driven by a long shaft which passes beneath the pilot's feet. This concentration of weight near the center of gravity aids in making the ship more maneuverable. The fact the engine is not in the nose permits convenient installation of the heavy armament.

The P-39 is probably the heaviest armed single-seater in production for Uncle Sam. Poking out of the ship's bullet-shaped nose is a 37 millimeter cannon which fires one

pound shells. Also located in the nose are four machine guns synchronized to fire through the whirling propeller blades. (Airacobras under construction for the Royal Air Force will probably be armed with even more machine guns.)

Another unique feature is found in the cockpit arrangement. To enable the pilot to "bail-out" in the event his plane is disabled, this fighter is equipped with two doors that fall away from the fuselage when a button is pushed.

Performance of the "Airacobra" is indeed remarkable. The top speed is reported to be over 400 miles per hour and the ship can reach an altitude of nearly seven miles. Landing speed is quite slow for this type plane, for it "comes-in" at 70 miles per hour—about the same speed as a Douglas or Lockheed transport. The fuel load of 140 gallons is sufficient for a flight of 1560 miles.

The proportions of the real plane make possible a graceful model with excellent flight char-



Decorations make it realistic

acteristics. Despite the low-wing, pursuit design, the little ship is capable of making stable, efficient flights of surprising duration. When being flown from a smooth, level surface, the tricycle landing gear enables the model to make extremely

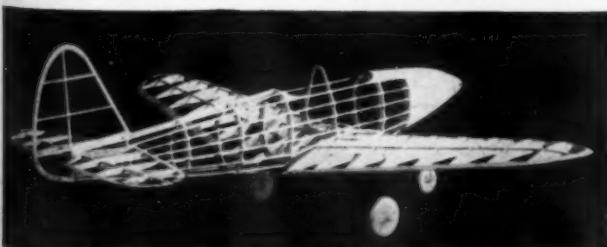
(Continued on page 52)



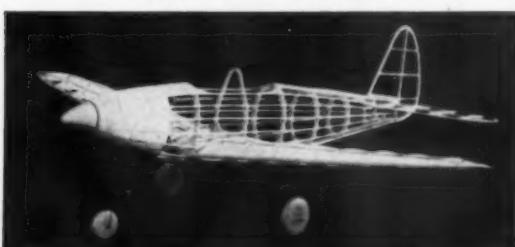
It is a beautiful flier



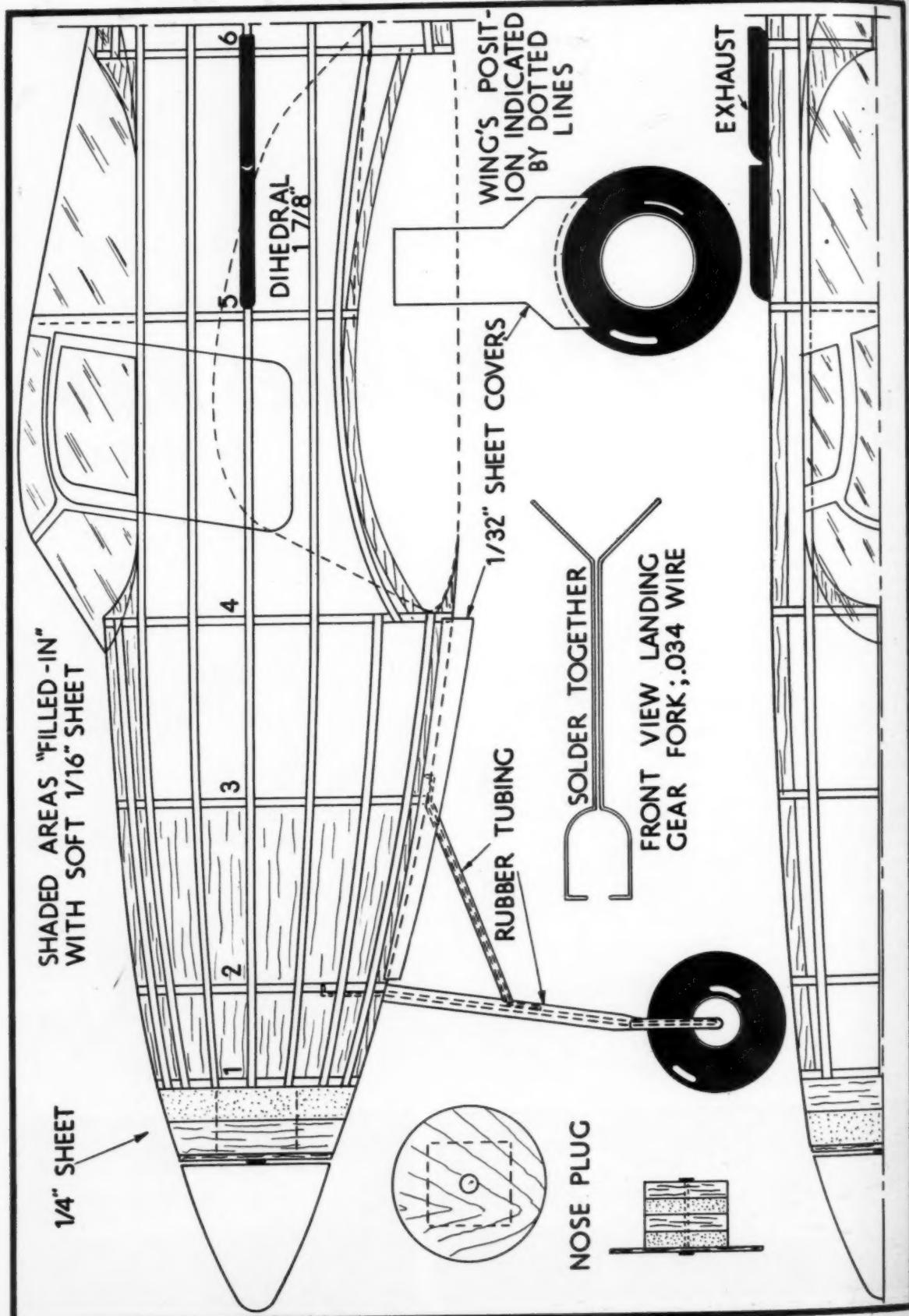
A large stabilizer makes it stable

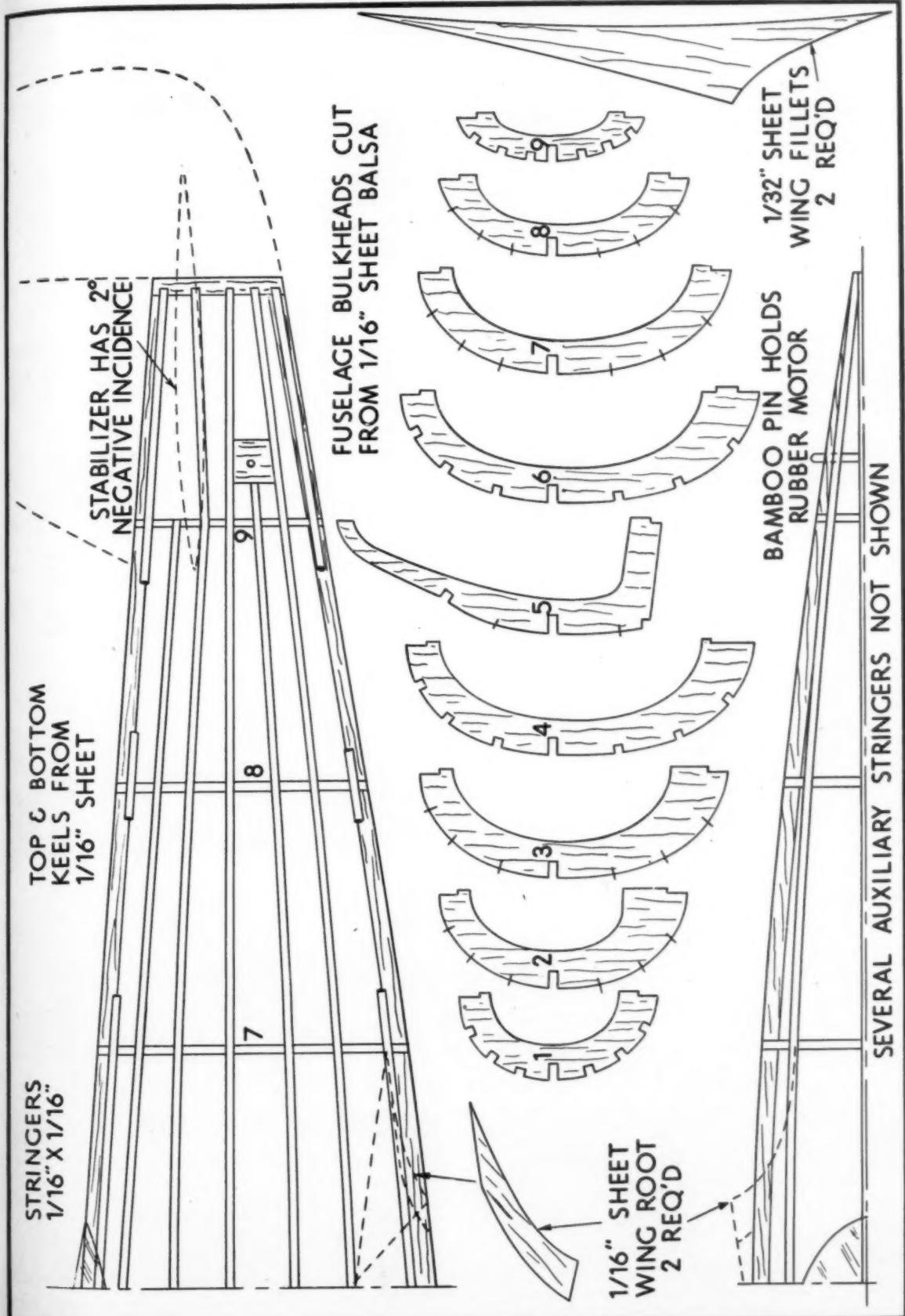


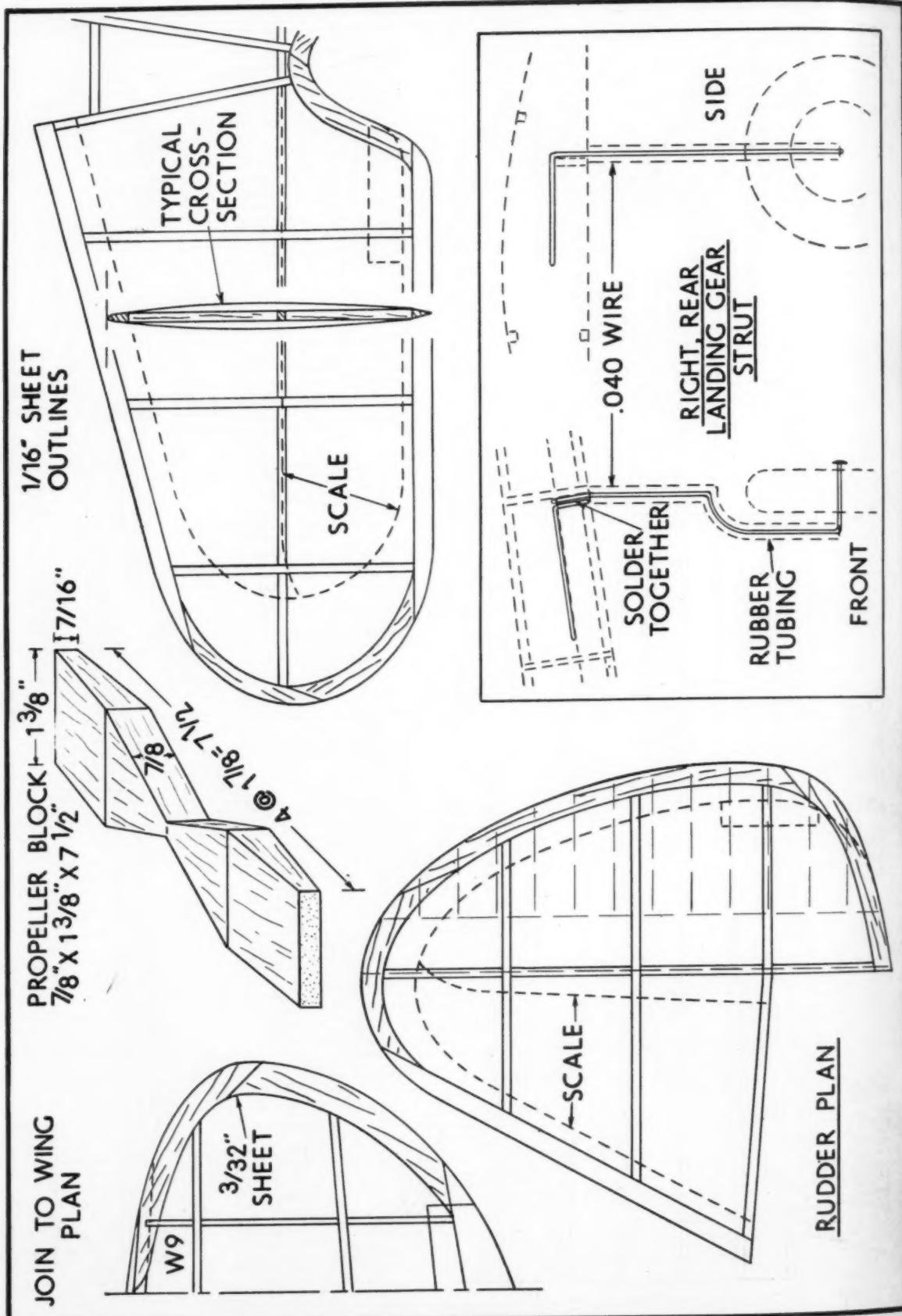
The framework is simple, light and sturdy



The nose wheel protects the propeller









The navy's new 4 engine Consolidated patrol bomber flyingboat, the PB2Y-2. It is heavily armed and cruises long distances

FRONTIERS

Highlights of the Latest Developments in Aviation

By ROBERT C. MORRISON

WHEN a manufacturer has a thousand men in his drafting room devouring a big slice from the company's payroll, he must divert some time spent maintaining the daily quota of airplanes produced as high as possible and consider what will be the

next product. No American company has yet to "freeze" a design and discharge its engineering personnel, and from the appearance of things it does not look as though such will ever be the case. But with a thousand engineers on hand, the manufacturer must ever be on the alert with new designs to keep them busy at all times. The engineering cost is tremendous; and the designs must be good to meet demands

of aircraft in these days of warfare. Thus, in spite of the fact that at the moment quantity production is the main issue, we will see just as many new designs as ever.

Douglas, we understand, is going to test fly another new airplane in the not-too-distant future, incorporating some

of that "red hot" performance . . . and we do not mean the B-19. Other new designs are also in the offing, including a new super-speed version of the "Boston" which has or is about to be ordered by Great Britain. It will be the Douglas DB-8A-5 while awaiting a name from the British. The present airplanes being delivered to the British in great numbers are designated DB-7B which is very similar to the French DB-7 light bomber.

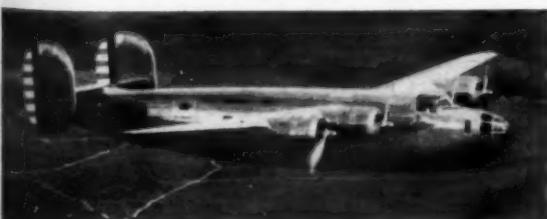
(Continued on page 60)



A Douglas DB7-A warms up. (F.P.G.)



The new 1700 hp. Curtiss XSB2C-1 navy dive bomber. It out-performs any other ship of its type in the world



The most powerful bomber in the world, the Consolidated XB-24. Its bomb-load and speed is tremendous



A Coast Guard Grumman JRF-2 (Williams)



Curtiss P-40s standard U.S. Army pursuit planes; top speed 370 m.p.h. Note the new type insignia. (Acme)



The latest U.S. Navy photographic plane, the Beech J.R.B-1. With two 450 hp. engines, speed is 230 m.p.h. (Arnold)

GAS LINES

AIR WAYS

NEWS OF MODELS AND BUILDERS FROM ALL PARTS OF THE WORLD

MANY model builders have heeded Uncle Sam's call and joined the U.S. Army, Navy or Air Corps; however, there are thousands who are still intensively following model activities in civil life. Many are looking forward to eventually being a vital part of the air program, either in industry or as a flier.

Consequently the hobby of designing, building and flying model planes is a hundredfold more important now than ever

before, for this sport becomes the basic aeronautical "training school" for all our young men. Even the army and full scale industry as yet do not realize the value of the fundamental knowledge our young men are gaining through this hobby—it is saving a tremendous amount of time in preparedness.

A model fan, when he enters an aviation school, has a thorough understanding of the basic principles of aero-dynamics, plane's structure, handling tools and the "thinking technique" required for this type of work. The ground has been prepared for quick advancement, compared to a student who knows nothing of aviation. Consequently, all model fans should follow the game with added zeal. The realization of the preparation the sport is giving for future advancement gives added importance to model flying during the coming season.

Wise modelers will follow the sport with a definite purpose in mind; that is, obtaining as much aeronautical information as possible.

Eastern States Contest

With announcement of the annual Eastern States Model Airplane Contest, fans will realize that the

Pict. 1. Johnny Walker's 10 ft. model Clipper flying over Lake Merritt on its maiden flight

flying season is in full swing. It is hard to believe this affair is again at hand. As last year, it will be sponsored by the Kresge Aero Club of the Kresge Department Store, Newark, New Jersey, and MODEL AIRPLANE NEWS. This will be the seventh annual Eastern States Champion Gas Contest held at Hadley Field, five miles south of Dunellen, N.J., on Saturday, June 7th: A tentative date; "rain date" will be announced later. The contest will include events for Classes A, B, C planes and an added Controlled Flight Event which will be announced. Models in this class can be either radio controlled or adjusted for predetermined flight by use of a timer or other mechanical devices.

Again, this year there will be a special award for the high point winner, as well as the traditional trophies and other valuable prizes. This year the awards are expected to surpass last year's, which ran over the \$1000 mark. Contest directors will be Messrs. Ben Shershaw, Leon Shulman and Charles H. Grant. The meet will be officially sanctioned by the Academy of Model Aeronautics and all new records will be officially certified.

As model builders who have attended other meets know, Hadley Field is one of the finest flying sites in the East. Last year the meet was a huge success, abundant

equipment being supplied by the sponsors, and it is expected this year to be even better. This contest should provide an excellent chance for competitors in the "Nationals" to test their ships and give them the "final touches" for the national competition, which will be held in Chicago the first part of July.

For further information and entry blanks to this contest write Leon Shulman, Director Kresge Aero



Pict. 4. A perfect 6-inch solid scale "Stuka" dive bomber built in great detail by Anthony Riccardi



Pict. 5. A high-speed gas job by Gerald Wolfram



Pict. 6. This scale Stinson 105, by Nestor Brown Jr., won 1st prize in a display contest at Springfield, Mass.



Pict. 7. Tad Dietrich's hydro gas job poised on the surface of Lake Champlain



Pict. 8. Snowbirds of Denver Exchange Gas Model Club, out for an airing



Pict. 9. Hadley Model Club members with Class A jobs



Pict. 2. The model Clipper is adjusted by Johnny Walker before the flight

Club, Kresge Department Store, Newark, N.J.

Now look at picture No. 1—here's a most unusual shot! It is not one of the large Clippers, as it appears, but only a ten foot model of one, snapped as it was flying over Lake Merritt, Oakland, Calif.

Picture No. 2 shows a close-up of it just before the flight. Its designer and builder, Jack W. Walker, is shown at the right in the stern of the boat. The plane was making its first flight when picture No. 1 was taken; unfortunately, though, it flew further than was expected and cracked-up on the base of the Lake Merritt boat-house. However, only the nose of the hull was smashed and this was easily repaired.

The ship required 1½ years to complete. One of the unusual features is the wing-like sponsons at the base of the hull. Up to the present time few, if any, model hydro's have successfully used this principle. This type sponson is a replica of that used on the full size Boeing trans-Atlantic Clipper.

Hydros are becoming more popular with each passing year, inasmuch as water provides a smoother and safer "landing field" than is available in many parts of the country. Usually there is a fairly good body of water convenient to the majority of modelers. As a rule, it is quite hazardous to fly exceedingly large gas models over land, due to many obstructions and poor landing places; water flying, however, should encourage development of large-span gas models. No one who has ever flown a gas model of ten or more feet will ever forget the thrill of seeing it take to the air.

Picture No. 3 shows a 52-inch-span Brown powered gas job built along the lines of a parasol-type pursuit ship. It was constructed by Tony Lubiniecki of Sturgis, Sask., Canada. This is a swell job and is most realistic when in flight.

You will note that small auxiliary airfoils are attached to the leading edge of

the wing in order to provide a slot effect. This helps prevent stalling and increases the climbing angle of the ship. The model weighs 4 lb. 2 oz., and will fly half-a-mile in a straight line before making a turn; on a calm day it has been timed over a half-mile course, making a straight-line flight, in 58 sec. This is approximately 31 m.p.h. The construction is all spruce; the top half of the fuselage is covered with cardboard, which gives stiffness, the rest with wrapping paper, applied with regular store, brown, powdered glue boiled with isinglass. The model was built to show the possibility of using ordinary materials in its construction.

Another, similar, model with slight wing and tail modifications, climbed to a very high altitude and then stalled in loops, Immelman turns and power dives; accomplished by merely setting the tail to stall after initial climb at full throttle—no mechanical devices were used to make it stunt.

Jim Froyer of Los Angeles is an amateur photo-



Pict. 3. Tony Lubiniecki's speed parasol gas job

grapher. He says many of his friends come to him for pictures of their models and one of the most amazing he has seen is shown in picture No. 4; built by Anthony Riccardi. It is an exact replica of the

(Continued on page 64)



Pict. 13. Chicago Riser Riders train for the "Nationals"



Pict. 14. Greg Loucks' scale Hawk, covered at last

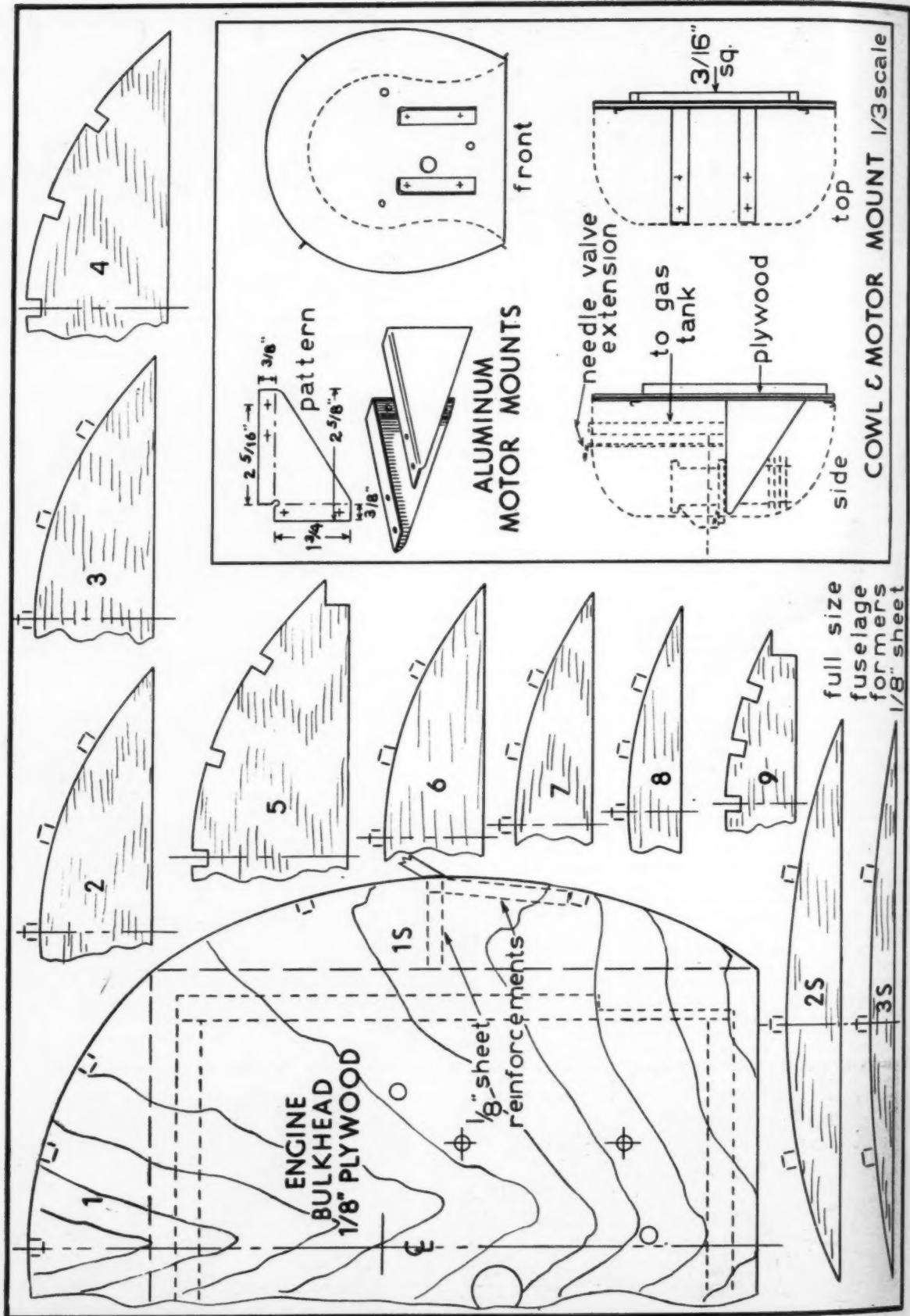


Pict. 10. A group of Springfield Torque Twisters get together for a local contest: One of the most active clubs in Mass.

Pict. 11. Model building class of the Goshen Central School, directed by Mr. George McGinnes, examine a model

Pict. 12. Finalists of the "Flight Command" contest with some of the prize-winning scale models. Miss Jeannette Eastman of New Rochelle, N. Y., won 1st prize; Victor Cordella, second.







It is of contest type, though a scale model



A perfect high-performing miniature of the full-scale plane

FOKKER D-8

Flies Again

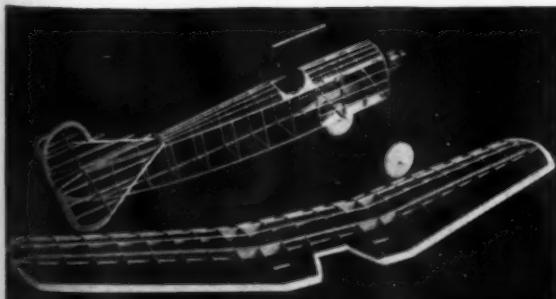
A Realistic Gas Model of a Famous World War Fighter That Performs Like a Contest Plane—

PART 1

DURING the closing weeks of the first World War there appeared over the front lines a nimble little monoplane that is generally credited as being the finest fighter of its day. This was the famous Fokker D-8 of the German Imperial Air Force. Powered by a rotary Oberursel engine of 110 horsepower, the D-8 had a speed of 115 m.p.h. It climbed at a rate of 1,500 ft. per min. and could ascend over four miles. In the ability to maneuver and dive it was un-



The climb is fast and steep



The uncovered framework shows strength and simplicity



The engine is neatly cowed



The author with completed model, ready for a flight

By EARL STAHL

excelled. So superior was the performance of this ship that it would have been a tremendous blow to the Allied air forces had any great number been completed before the war's end.

In selecting a design for a flying scale gas model one can scarcely find a better subject than the Fokker D-8; for here is a plane with aerodynamic proportions similar to the majority of contest models. A very short nose combined with a long tail moment arm, tail surfaces of proper proportions and a parasol wing of generous size, all contribute to the model's stability. In construction the D-8 is extremely simple and practical and anyone who has built rubber or gas models with success should experience little difficulty in duplicating it.

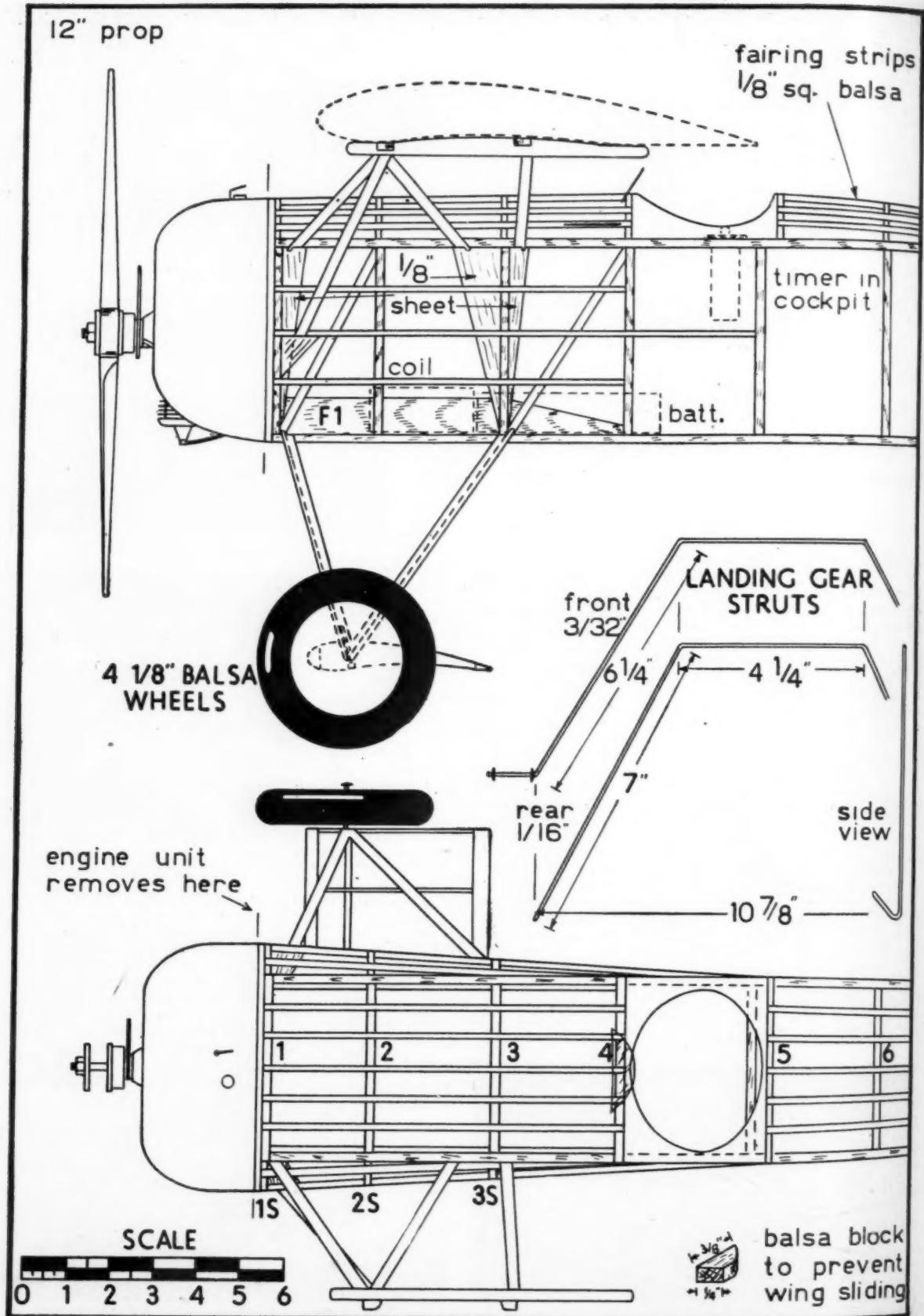
Our model Fokker D-8 was designed to fly successfully with any Class B engine; however even the smaller Class C power plants should prove satisfactory. The wing span is 57" and the weight with intermediate size batteries is 28 ounces. This makes the wing loading about eight and one-half ounces per sq. ft. An inverted Ohlsson "23" swinging a 12" propeller was used to power the original model.

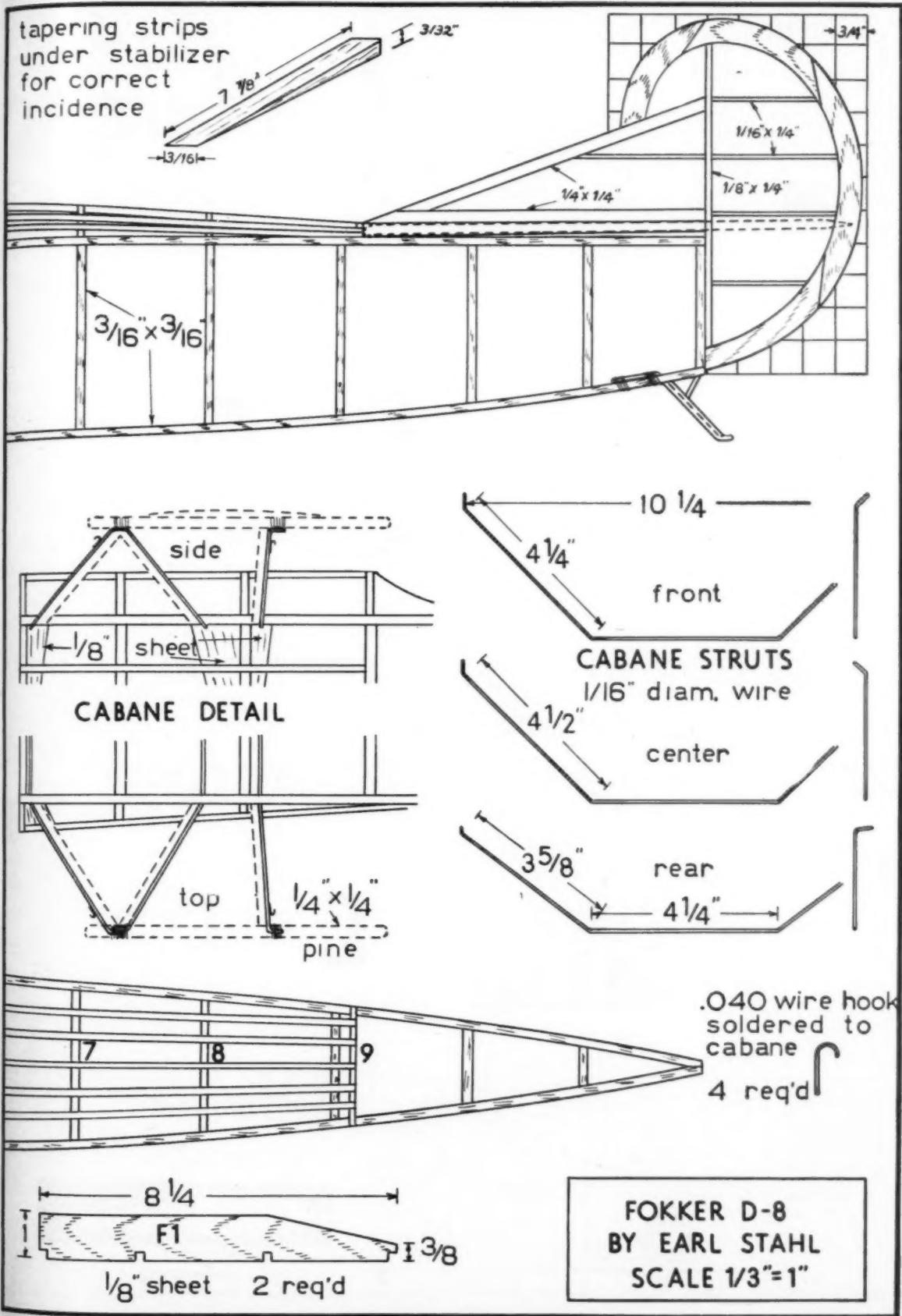
How does it fly? Well, test flights were conducted high in the snow-covered mountains of Pennsylvania with the temperature uncomfortably below freezing. With the regular 20-second engine run, flights of one and one-half minutes were made, which is certainly not bad for a scale model. Entirely unassisted the little ship lifts from the runway after a short run and eases into a fast circling climb. Under power the circles are to the left and at the top of the climb it "rolls-out" into a flat, level glide.

(Continued on page 34)



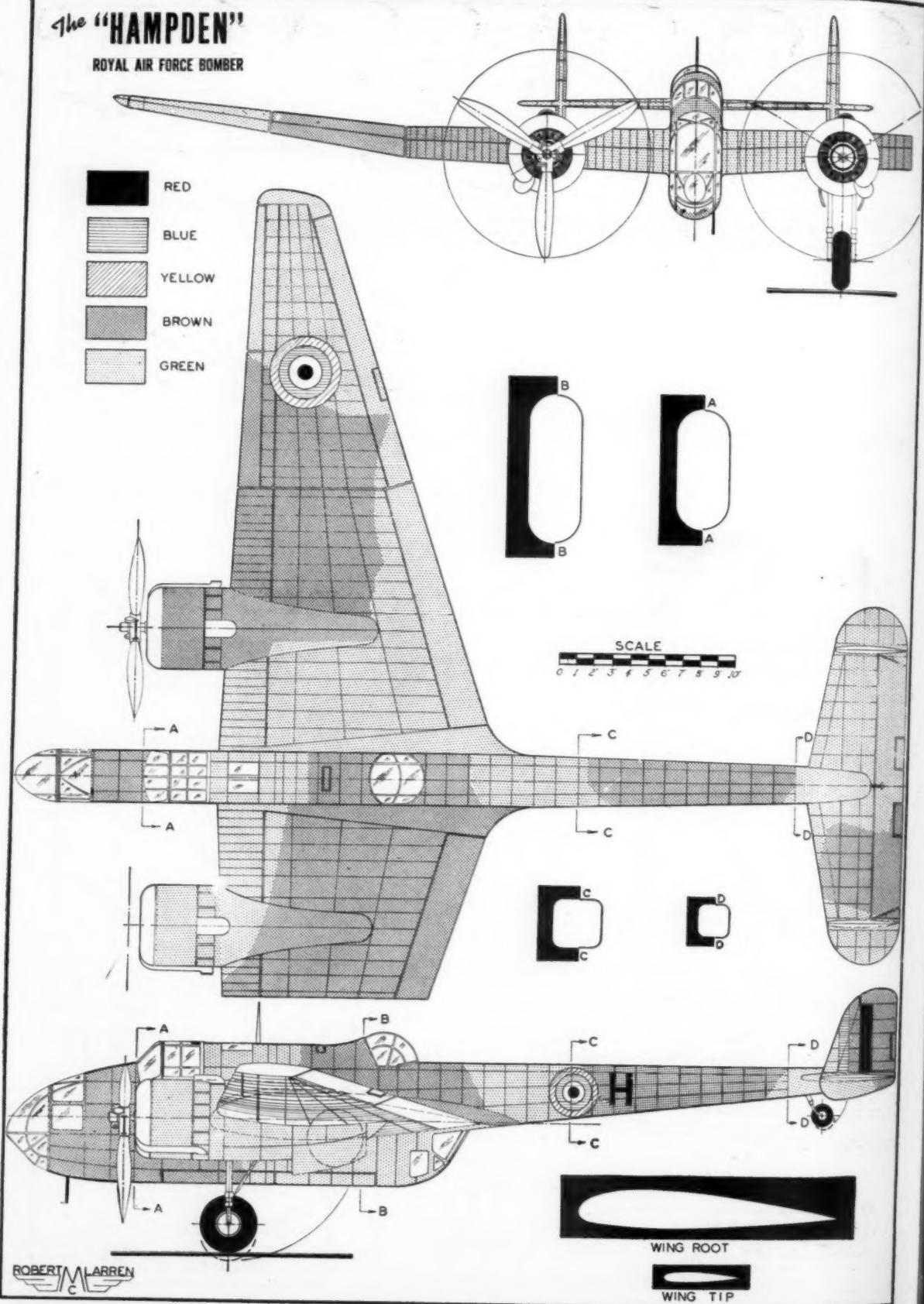
Carefully detailed, it closely resembles the full-scale plane





The "HAMPDEN"

ROYAL AIR FORCE BOMBER



ROBERT M. LARREN

Blaster Of Berlin

THE PLANE ON THE COVER

By ROBERT McLAREN

THE Handley-Page "Hampden," our plane on the cover this month, is one of the most remarkable machines ever designed. It is truly an "all-purpose" combat plane, for it combines the bomber's load-carrying ability with the fighting plane's speed and the attack plane's death-dealing characteristics. And after this first year-and-a-half of World War II, it has had to do all of these punishing assignments and half-a-dozen more. The light-bomber is a great compromise; for one thing must give way to another until it seems the finished plane will excel at none of them. But cleverly the Handley-Page designers combined all the many requirements of this type into a single ship which excelled at all of them. And

they labeled it: "The Hampden!"

Handley-Page has been building airplanes since the time of the Wright Brothers, but, oddly enough, it was not until the introduction of the Hampden in 1936 that this venerable firm brought out a ship of all-metal design and also one with a retractable landing gear.

Most outstanding feature of the Hampden Bomber is not the ship itself but its remarkable method of construction and assembly. The complete airplane has been broken down into its component parts in such a manner that there are no main assembly jigs. Each component part is fabricated in a small jig and final assembly consists only of bolting these various parts together.



The fast new Hampden, long-range bomber and mine layer

FUSELAGE: The fuselage of the Hampden is built in three major sections: the nose section comprising the forward glass enclosure and the pilot's cockpit, the center-section so arranged as to provide access for the wing, and the tail section, all of which are bolted together. The nose section is built up on a frame of basket-work channel-sections which secured the glass panels in place.

The center section is built in vertically-split halves and joined in the middle. The various lines, fitting and controls for the pilot are installed in each half-section without the workmen crowding each other. The bulkheads are all of hat-section-formed aluminum riveted to four main

(Continued on page 54)

THERE'S been a little matter troubling us during the past few months—in fact, ever since the National Defense program slipped into high gear.

With the armories in use by our National Guard and army units, many indoor enthusiasts have found they can no longer fly in accustomed spots. So what do some of these modelers do? Do they go out and look for a smaller hall? No, sir, they sit around, wring their hands, bemoan their luck and decide to give up modeling. Aren't they a bunch of sissies, though? Take a look at England. Do you think

FLY THEM ON A STRING

SUGGESTS THE INSTRUCTOR

the model flyers over there have a bed of roses? Not a bit of it! Even before the outbreak of hostilities there were few large buildings available to indoor modelers or outdoor flyers when inclement weather prohibited flying of outdoor craft.

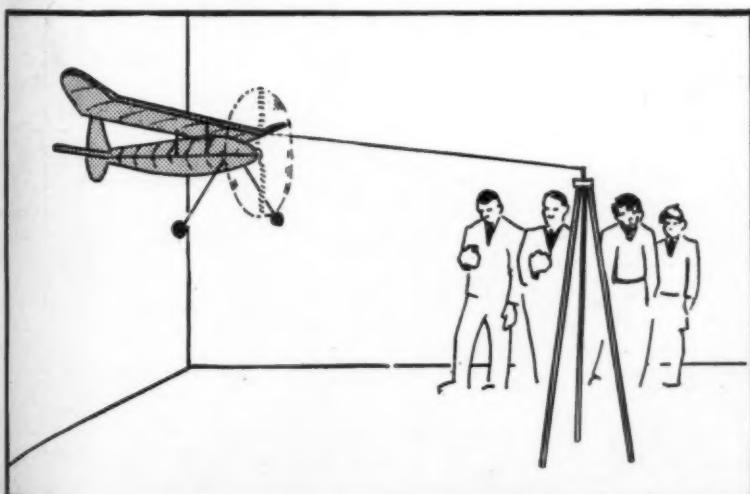
So the English lads developed "round-the-post" flying. By setting up "pylons"

in small halls they were able to fly outdoor rubber-powered craft and heavier types of indoor models inside small halls. Everybody had a lot of fun and many interesting problems presented themselves, such as proper type of pivot to use and how to attach the tether to the model. And should one or two point attachment be used? The accompanying sketch adapted from a cover illustration of "The Aeromodeler" best explains pylon flying.

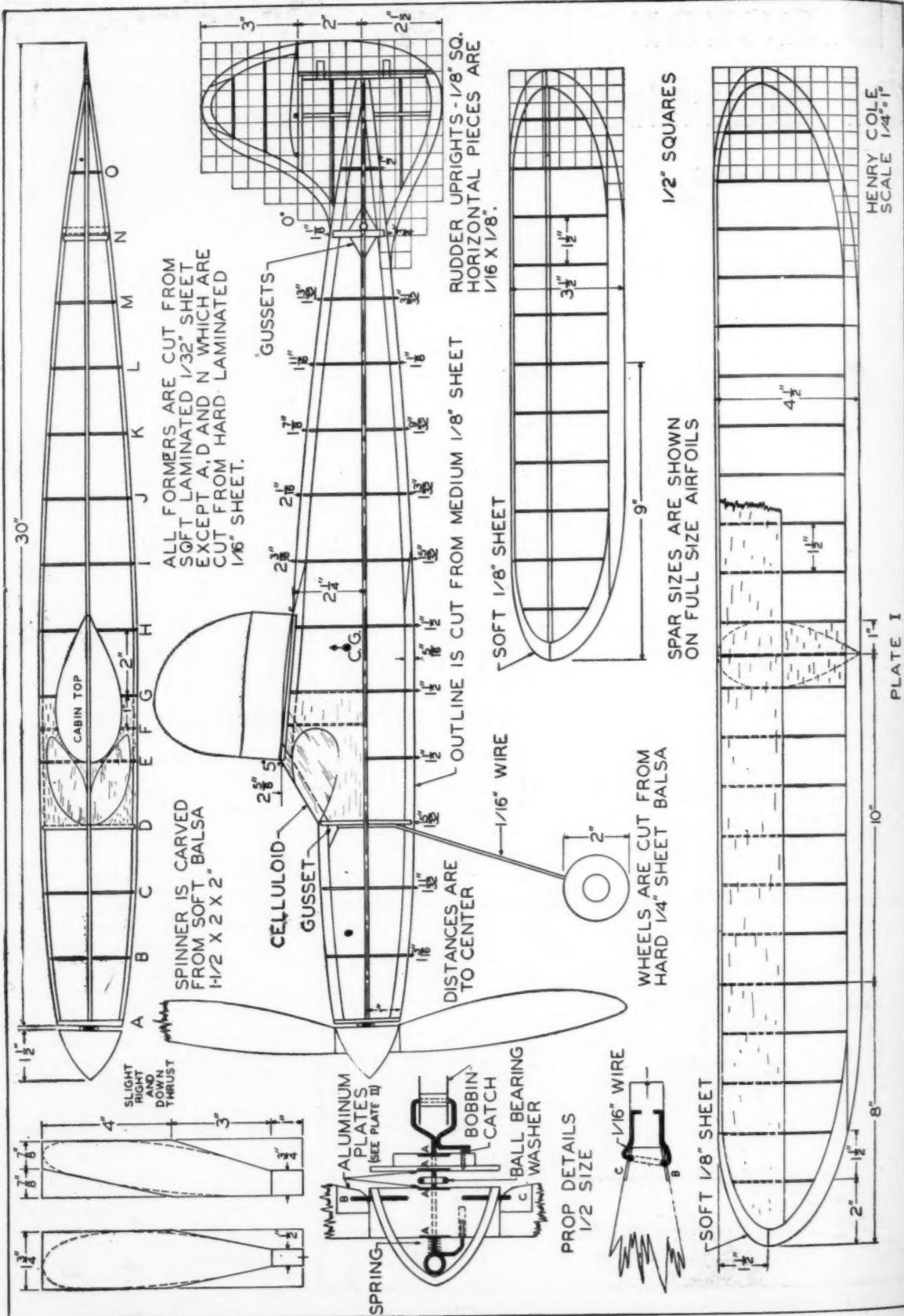
Now let's demonstrate that we are as resourceful as our fellow flyers across the water. Pylon flying can be the basis for some very fine competition with plenty of fun assured participants. In addition to such flying, it is suggested that "stunt" and "stunted" events be held. Stunt events can be run off for original design models which perform unorthodox gyrations; "stunted" events can be held for "models" of models—twin-pushers of 10 or 12-inch wingspan, rubber powered miniatures of gas models, and similar inane but humorous craft.

"Tethered" flying is also an excellent means of clubs putting on flying demonstrations from the stage of an auditorium, or at a hobbycraft show. It's really quite a sight to see a model take off by circling around a pylon and make a flight of one or two minutes through this method of "controlled" flight. Who knows—maybe

(Continued on page 34)



"Tethered" flights can be made in small space indoors



STRATOSPHERE CONTEST MODEL

**A Super-Duration Fuselage Plane
With Extremely High Power-Weight
Ratio—It Has Made a Flight of Thirty-Five Minutes**

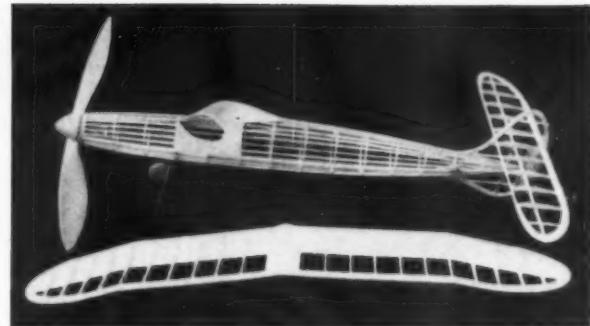
THIS model was designed primarily for attaining high altitudes, and first test flights were entirely up to expectations. However, after just a few flights, the plane flew out of sight and was lost. Although it set a new local record of 18 minutes and was followed for 35 minutes, the loss was heartbreaking because it prevented entering the model in contests.

The second test model was improved and changed as experience with the first one directed. Better performance was ap-

parent immediately. Although the large prop turned slowly, the ship climbed at a steep angle and attained altitudes as high as most gas jobs.

The principle behind this climb is simple! The ship was built extremely light and brought up to weight rule with a heavy motor. Many model builders realize the advantages of high power-weight ratio, but few use the extra power efficiently. Therefore we took care to use as much stored energy as possible towards getting altitude. A large prop and streamlined fuselage seemed to be the logical combination. The fuselage was especially designed to give a smooth airflow around the wing and stabilizer as well as prevent burbles over the fuselage during the climb.

The only time the model had a chance to partially show its contest ability was at a meet in Tacoma, Washington, though a cold, gusty wind made long flights impossible. In spite of this high wind, the plane flew very steadily and placed first with a three-flight average of 2 minutes. At this time only three-quarters maximum



Construction of the light but strong frame work is simple



The start of a record 18 min. flight

winds was used. Later it was found that the model averaged from 2.30 to 3 minutes with maximum turns in calm air. We warn you, if there are any thermals around, the ship is sure to soar away!

If results with the smaller ship are any indication, a scaled-up ship of Wakefield size should out-perform anything in the field. If you want a super ship for 1941, let's start construction.

Fuselage

At first this type of construction may appear difficult, but with a little practice streamlined fuselages can be made as light as the box type, and without spending very much more time. First, a full-size drawing of the side view must be made. For this purpose dimensions to the center line are given on Plate I. By drawing 1/2" squares, the rudder is drawn accurately on the side view. After this is done, the keel and rudder outlines, which are cut from medium 1/8" sheet, are glued together and pinned to the drawing. The rudder is flat and can be completed on the drawing. Be sure that the 1/8" square piece on which the stabilizer is mounted is parallel to the center line.

While the outline and rudder are drying, the formers should be cut. All, except special formers, are drawn full size on Plate II, giving the outside outline only. These formers are 1/4" wide. The complete outline of the special formers is given on Plate II. Note that the formers are cut from laminated balsa sheet; this not only adds strength to the fuselage, but allows use of lighter wood. Laminating is a simple process: Lay out a balsa sheet on a flat surface, and from another balsa sheet, cut short lengths equal to the width of the first sheet. Glue these crossgrain to the first sheet, press in place until dry. Laminated 1/32" sheet is really 1/16" thick.

After all formers are cut, glue half of them in place, following the outline on

(Continued on page 49)

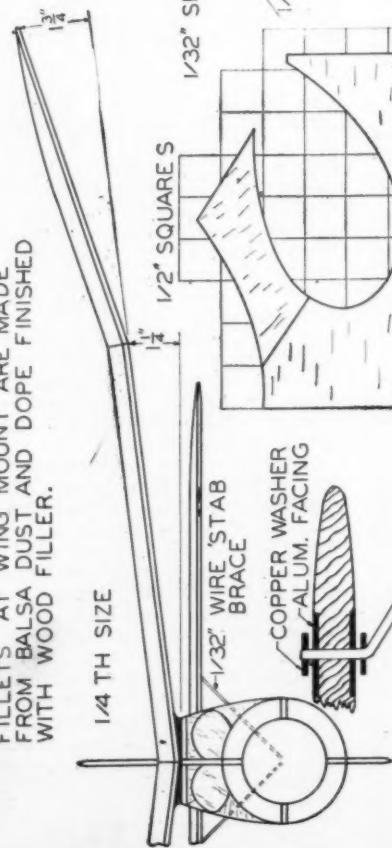


Gliding in with prop. folded

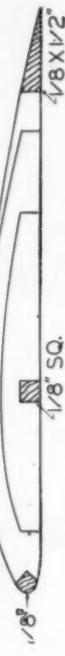


Its long span and ample propeller blade area insure long flights

FILLETS AT WING MOUNT ARE MADE FROM BALSA DUST AND DOPE FINISHED WITH WOOD FILLER.



FULL SIZE STABILIZER RIBS - SOFT 1/16" SHEET



FULL SIZE WING RIBS - SOFT 1/16" SHEET



CUT 2 AND GLUE TO KEEL AT WING JUNCTION

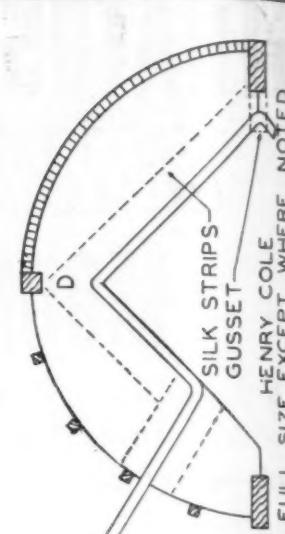
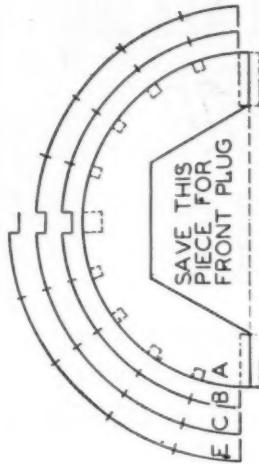
CABIN TOP
1/8" SHEET



PROP FITTINGS



REAR MOTOR
PLUG FITTING



FULL SIZE EXCEPT WHERE NOTED

FORMERS ARE 1/4" WIDE.
FORMERS E AND F STOP
AT CENTER AS SHOWN ON
SIDE VIEW. (PLATE I)
POSITION OF 1/16" SQ.
STRINGERS IS MARKED ON
FORMERS.

PLATE II

Academy of Model Aeronautics

A Division of the National Aeronautic Association

OFFICIAL MODEL AIRPLANE NEWS

Chapters and Affiliated Clubs Financial Statement of A.M.A.

THE following listing of Academy of Model Aeronautics Affiliated Clubs and Chapters is presented for the convenience of those who wish to contact modeling organizations from time to time. The club listing provides helpful reference material which every club leader and reader of MODEL AIRPLANE NEWS should find of value.

PHOENIX MODEL AEROPLANE CLUB, % Gaylord H. Webster, 934 E. Van Buren, Phoenix, Ariz.

LITTLE ROCK GAS MODEL CLUB, % H. A. Thomas, 3407 W. 9th, Little Rock, Ark.

"NEWS" AIR CADETS, % R. L. Smith, THE NEWS, Los Angeles, Calif.

SACRAMENTO MODEL AIRPLANE CLUB, % T. Ravellette, 3124 Fourth St, Sacramento, Calif.

EXCHANGE CLUB GAS CHAPTER, % Frank Higberg, 2951 Williams, Denver, Colo.

FAIRFIELD GAS CLUB, % Peter E. Polito, 1494 Post Rd., Fairfield, Conn.

THE GAS MODELAIRES, % Edward F. Orlowski, 81 Lawrence, Hartford, Conn.

MODEL AERO ENGINEERS, % Thomas Hogan, 334 Trumbull, Hartford, Conn.

MANCHESTER GAS MODEL CLUB, % Michael L. Vetrano, 52 Garden, Manchester, Conn.

BRIDGEPORT GAS MODELERS, % Fred Weinmann, 13 Oak Ave., Milford, Conn.

NEW HAVEN MODEL AIRPLANE CLUB, % Dr. Paul MacCready, 156 E. Rock Rd., New Haven, Conn.

NORWALK GAS MODEL CLUB, % T. A. Hoggson, 12 Rowan, E. Norwalk, Conn.

DARIEN REBEL-AIRS, % T. Ryley, 215 Cove Rd., Stamford, Conn.

JACKSONVILLE MODEL AERO CLUB, % Nathan L. Mallison, Dept. Public Recreation, Jacksonville, Fla.

LAKELAND MAD MODELERS CLUB, % Walter Seegmiller, 921 Osceola, Lakeland, Fla.

ST. PETERSBURG MODEL CLUB, % D. R. Persons, Box 1313-A, St. Petersburg, Fla.

TRIBUNE AIR CADETS, % R. W. Simpson, TAMPA TRIBUNE, Tampa, Fla.

ATLANTA AERO ENGINEERS, % H. R. Hudson, 782 Techwood Dr., Atlanta, Ga.

CONSTITUTION AIR CADETS, % Lamar Q. Ball, ATLANTA CONSTITUTION, Atlanta, Ga.

T. M. STONER N.A.A. JR. CHAPTER, % Russell A. Perry, Dir. City Recreation Dept., Au-

hora, Ill.

BLOOMINGTON GAS MODEL CLUB, % J. R. McIntosh, 214 E. Washington, Bloomington, Ill.

TIMES AIR CADETS, % Maurice Roddy, CHICAGO TIMES, Chicago, Ill.

GAS MODEL AERONAUTS, % R. L. Webber, 217 N. Desplaines Ave., Chicago, Ill.

THERMAL HUNTERS, Leon A. Wilson, 1224 Gilbert Ave., Downers Grove, Ill.

ELGIN THUNDERBIRDS, % Marshall H. Nicoloff, 770 S. Liberty Ave., Elgin, Ill.

PRETZEL GAS MODEL CLUB, % Nolan Kleckner, 18 E. Washington, Freeport, Ill.

HENRY AERO CLUB, % Richard Finfegeld, Henry, Ill.

KEWANEE GAS MODEL CLUB, % F. W. Priestman, 330 McKinley Ave., Kewanee, Ill.

CHICAGO AERONAUTS, % Stephen Meuris, 5757 Campbell, Chicago, Ill.

DANVILLE GAS MODELERS, % H. W. Robertson, Vets Adm. Facility, Rm. 214, Danville, Ill.

PEORIA AIR SCREWS MODEL CLUB, % William Roach, 506 Charleton, Peoria, Ill.

ROCKFORD GAS BUGS, % R. K. Wilson, 411 East State, Rockford, Ill.

STATE-REGISTER AIR CADETS, % R. L. Stubbs, STATE-REGISTER, Springfield, Ill.

CULVER ACES MODEL CLUB, Byron H. Studebaker, 1010 S. Main, Culver, Ind.

MAD MODELERS, % John F. Buecker, R. R. No. 1, Calif. Rd., Ft. Wayne, Ind.

NEWS-SENTINEL AIR CADETS, % Helene R. Foellinger, NEWS-SENTINEL, Ft. Wayne, Ind.

GARY DIV. N.I.G.M.A., % Bob Roberts, 110 W. 7th Ave., Gary, Ind.

HAMMOND DIV. N.I.G.M.A., % Russell Rickmann, 488 Sibley, Hammond, Ind.

INDIANA GAS MODEL ASS'N, % T. M. Stephens, 959 Rochester Ave., Indianapolis, Ind.

LA PORTE DIV. N.I.G.M.A., % W. H. Twigger, 919 Lincolnway, La Porte, Ind.

PULASKI MODEL CLUB, % Jas. F. Cahill, 24 Bridge, Pulaski, N.Y.

AERONEERS, % Edward Freibury, 1318 Stamford, Schenectady, N.Y.

AERONEERS GAS MODEL CLUB, % John Schneider, 355 Mohawk Ave., Scotia, N.Y.

SIDNEY MODEL AIRPLANE CLUB, % Stanley S. Zamory, Public Schools Dept., Sidney, N.Y.

SYRACUSE MODEL AIRPLANE CLUB, 214 Hudson, Syracuse, N.Y.

WARSAW AERO CLUB, % Clyde Miller, 156 W. Court, Warsaw, N.Y.

WESTCHESTER GAS MODEL CLUB, % A. D. England, Westchester Co. Office Bldg., White Plains, N.Y.



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MODEL AIRCRAFT CLUB, % John Haltiwanger, 1315 Horace Mann Ave., Winston-Salem, N.C.

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MARION GAS MODELPLANE CLUB, % Verlin F. Haines, 631 Miami, Marion, Ohio.

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OKLAHOMAN-TIMES AIR CADETS, % Benjie Turner, OKLAHOMAN TIMES, Oklahoma City, Okla.

PORTLAND GAS MODEL CLUB, % Harry N. Fosbury, 5104 SE 87th Ave., Portland, Ore.

SALEM MODEL AIRPLANE CLUB, % Elmer J. Roth, 21st & Market, Salem, Ore.

PLANE DOPE MODEL CLUB, % Al O. Harvey, 437 Franklin Ave., Aliquippa, Pa.

GAS MODEL AIRPLANE ASS'N, % George Stahl Jr., 315 N. 10th, Allentown, Pa.

ALLENSTOWN MODEL CADETS, % Ernest C. Schaffhauser, 636 N. 10th St., Allentown, Pa.

DELA CITY GAS MODEL AIRPLANE ASS'N, % G. Brassington, 1126 Remington St., Chester, Pa.

DISPATCH-HERALD AIR CADETS, % R. J. Virtus, DISPATCH-HERALD, Erie, Pa.

M.M.I. MODEL AERONAUTICAL CLUB, % Neal E. Wood, 135 Ridge, Freeland, Pa.

CAPITAL CITY CLOUD CHASERS, % Dr. J. C. Bachman, 2121 Perry, Harrisburg, Pa.

LEWISTOWN GAS MODEL ASS'N, % Wilson Shields, 543 Valley, Lewistown, Pa.

MAIN LINE MODEL AIRCRAFTERS, % Geo. C. White Jr., 4805 Walnut, Philadelphia, Pa.

NORTHEAST EXPERIMENTERS, % Robt. E. (Continued on page 38)



AIR YOUTH OF AMERICA



Important News About Modelers

RESULTS OF "I WANTED WINGS" CONTEST

an eight foot wingspan all-white gas job.

Haaren High School, in New York City, won the prize for the local school with most entrants; Leon Schulman and his Kresge Aero Club came over from Newark to win the trophy for the out-of-town club with most entrants. Awards were also made to the oldest and youngest entrants.

A distinguished group of well-known men acted as honorary judges included Tom Beck, president of Air Youth; Roger Wolfe Kahn, chief timer and chief judge of the National Aeronautic Association contest board; Captain Minthorne W. Reed and Second Lieuts. Max McNeil and Rush Willard, of the U. S. Army Air Base at Mitchel Field; William Enyart, vice-president of the National Aeronautic Association; Carl Norcross, assistant editor of "Aviation" Magazine; Charles B. Gale, editor of "Sportsman Pilot" Magazine; Al Bennett, president of Bennett Air Service, and Wallis Rigby, King Features Syndicate artist and noted British model airplane expert.

Respective trophy winners and judges for each event were:

CLASS I—(Non-Flying Military)

Judges: Carroll Moon (Contest director in Southern New York)

Nick Limber (Designer, and experimenter)
Earl Sotscheck (Veteran contest judge)

Junior Event Winners:
Allen Lavie, New York City

Harvey Felder, New York City
Phil Heelan, New York City

Senior Event Winners:

Teed Westlake, Thomaston, Conn.
Victor Codella, New York City
Frank Fisher, New York City

Group of contestants with their planes anxiously await decision of judges

CLASS II—(Flying Military)

Judges: William Effinger (Model aircraft design authority)
Ed Miller (Design and assembly specialist)

William Winter (Associate editor of "Air Trails" Magazine)

Junior Event Winners:

John Dee, New York City
Andrew Busch, Woodside, N. Y.
Clayton Randolph, New York City

Senior Event Winners:

Humbert Mascuba, New York City
Louis Cairo, Bronx, New York
William Bua, Jamaica, N. Y.

CLASS III—(Non-flying Sport and Transport Replicas)

Judges: Frank Zaic (Internationally-known builder and designer)
Leon Schulman (Director of Newark Kresge Aero Club)

Junior Event Winners:

Santino Mazzu, Woodhaven, N. Y.
William Carson, Croton Falls, N. Y.
Lorenzo Zapata, Brooklyn, New York

Senior Event Winners:

Charles D. Daly, Hempstead, N. Y.
Jeanette Eastman, New Rochelle, N. Y.
W. H. Bowen, Jackson Heights, N. Y.

CLASS IV—(Rubber-Powered Cabin)

Judges: Al Ort of (Former national record holder for take-off water cabin models)

Max Juris (Experienced contestant and contest judge)

Edmond Garbriel (Model builder & experienced judge)

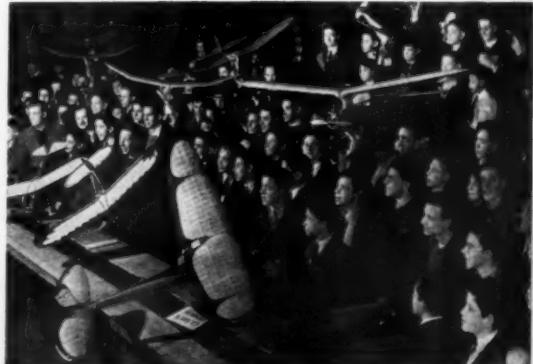
Junior Event Winners:

Edward Carstens, Queens Village, N. Y.
E. Bornstein, New York City
Arnie Greenhouse, New York City

Senior Event Winners:

Harry Schindelman, New York City

(Continued on page 72)



First prize of \$250 for best-in-show went to Charles D. Daly, a young aviation mechanic, whose beautifully detailed replica of Major Al Williams' Grumman Gulfhawk was appraised by the judges as a notable piece of craftsmanship. Daly told the judges that he planned to use the prize money for development of an aviation accessory he is working on.

A balsa and tissue-paper cabin model, for which the materials cost twenty-five cents, won \$125 for Edward Carstens, sixteen-year-old model builder.

Veteran of many contests and winner of more than twenty-five trophies, Joseph Raspante placed third, winning \$75 with



Contest Judges, Leon Shulman, Charles Grant, Frank Zaic



Charles Daly, winner of contest (holding model), and A.Y.A. officials



The Lockheed "Lodestar," the fastest twin engine transport in the world. Top speed 262 m.p.h. The French African Airlines have ordered many of these

U.S. ARMY AIR-CORPS—England is getting the first of 22 Boeing B-17C four-motored Flying Fortresses. Four have already been delivered to Montreal, where they will be conditioned and test flown by R.A.F. officers preparatory to the Trans-Atlantic flight.

In an effort to speed training of air corps fledglings, civilian instructors are now being used to provide basic training time for trainees in the second stage of their schooling. This move releases nearly four hundred veteran U.S. Air Corps "BT" instructors for primary training and supervisory work.

Almost twice as big as Douglas' giant B-19, now soon to fly, is Martin's new giant which will carry 40,000 bomb-pounds 7,000 miles at a speed of 300 miles per hour. But the construction of this monster is another four-year job!

Named after the veteran Senator, McCarran Field was recently dedicated at Las Vegas, Nevada. Comprising 3200 acres situated only seven minutes from vital Hoover Dam, the huge field will have six 5,000-ft. runways and will house 1400 enlisted men and officers and 242 air cadets at a time. Two aerial gunnery divisions will be stationed there. The \$3,139,000 port will serve as Las Vegas' Municipal Airport, T.W.A. airline terminal and the huge army air corps establishment.

The navy wants to move back into Sunnyvale lighter-than-air station, which was re-named Moffet Field and taken over by the air corps as the Western Division Basic Training Station. The air corps group will be moved south to March Field, Riverside and the navy will re-take possession to continue its lighter-than-air experimentation, recently re-established by Congress.

The U.S. first barrage balloon went up recently at Fort Lewis, Washington. First of a dozen to be used for tests, the small egg-shaped balloon was inflated with helium and sent up over Gray Field on a 3/4" cable. It will be used to train the Third Balloon Barrage Squadron, the only such organization in this country.

The first all-negro unit of the army air corps was announced recently as the 99th



Special To Model Airplane News:

Pursuit Squadron at Tuskegee, Alabama. Full strength, it will be composed of 33 pilots and 276 enlisted ground-crew men. Training will be done at Chanute Field, Rantoul, Illinois.

Final settlement of the dangerous Wright Field labor strike in which for 17 days more than 400 men refused to continue work on the essential \$5,900,000 expansion program at the vast test center of the U.S. Air Corps, was reached and work is now being rushed to completion. Among the new additions are a wind tunnel, torque stand, administration building and dynamometer laboratories.

Age-old controversy over a combined United States Air Force under a single Department of National Defense was debated in Congress recently but both army and navy officers turned thumbs-down on the proposal. During the testimony it was

country will have an air force which will equal or surpass that of any other nation."

Six of the sixteen combat planes built by North American for Thailand (Siam) have been confiscated by the U.S. Air Corps and will go into service as AT-6A advanced-trainers. The first ten were shipped to the tiny Indo-China nation but its subsequent role as an aggressor nation forbade shipment of the additional six stored in a warehouse.

Major Russell Randall of the 12th Pursuit Wing, Panama City (Albrook Field) was forced to bail out of his obsolescent Boeing P-26A pursuit plane when motor trouble developed over the dense Panamanian jungle. He hiked twenty miles back to the field to report the incident.

The air corps lost its first parachute trooper when Sergeant Floyd S. Beard of Company C, 501st Parachute Battalion, Fort Benning, Georgia, failed to pull his emergency chute ripcord after his automatic chute failed to open.

Two other Boeing P-26A pursuit ships locked wings over Albrook Field, taking the life of 2nd Lieut. Albert C. Skog and saving the life of 2nd Lieut. William S. Swanson, who miraculously returned his badly damaged fighter to the field.

An A-17 (Northrop) attack plane crashed into Coos Bay near Hamilton Field (Calif.) drowning Major R. C. McDonald. Lt. J. J. Trauelnicht swam to safety after vainly trying to extricate his superior in an effort to save him.

U. S. NAVAL AVIATION—Announced with a tremendous fanfare of publicity is the new Curtiss XSB2C-1 two-seater navy scout-bomber widely heralded as "twice as deadly as any existing dive-bomber." This would place its performance at 350 miles per hour with a bomb load of 2200 pounds and twice the gunfire of the famed Junker JU-87B "Stuka."

(Continued on page 69)

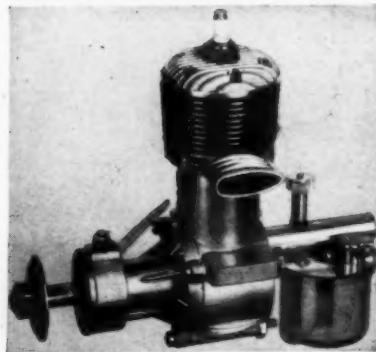


The latest North American pursuit, XP-51, which has an extremely high speed; powered with a 1150 h.p. engine

shown that the air corps now has more than one hundred thousand men and the present program called for 800,000 men at its completion. This was compared with Germany's present million and the Royal Air Force's near-million.

Major General George Brett, acting Chief of the Air Corps states: "I am immensely pleased with recent progress which definitely shows that within one year this

the new 1/5 H.P., B class
FORSTER "29"



.297 Inch—1/5 H.P.—\$16.75 complete

is setting new high standards for Quality Motors. See it, hear it, then decide for yourself.

It is "Tops" in speed, power and precision—the motor of champions!

Write today for circular "B"



For "C" class contest planes and Radio Controlled planes, consider the advantages of the

SUPER "99"



.997 inch—1/2 H.P.—\$20.75 complete

In speed range it compares with the modern airplane motor. The throttle equipped carburetor regulates the Speed and Power. Especially suited for

RADIO CONTROLLED PLANES

Write for circular "C"

If your dealer does not stock Forster motors, send your order to the factory.

FORSTER BROTHERS
 1415 LAKE ST.
 MELROSE PARK, ILL.

Elements of Radio Control

(Continued from page 9)

ployed to give a bit more stability and also for better power output.

The circuit as seen in Fig. 3 is simplicity itself, and a prospective builder should be able to turn out such a rig in short order, particularly as the power supply comes all wired and ready for installation.

The case is 10" x 10" x 7" and comes equipped with handle, front and rear panels. The 9" x 6 1/2" x 1 1/2" chassis is bolted to the panel after the various holes are cut, and additional support is afforded by the diagonal braces of 1/2" x 1/8" brass or dural. As the frame of the variable tuning condenser is at ground potential, it may be bolted directly to the panel and also fastened to the diagonal brace at the rear for extra support.

To make the outfit as flexible as possible, a variable coupling coil controlled from the front panel has been provided. This consists of four turns of No. 16 insulated wire bunched closely together and fastened to a strip of Victron which in turn is held on the movable shaft. One end of the coil is connected by a flexible lead to the upper center terminal on the panel. The other end has a flexible lead terminated in a clip which may be snapped either on the left hand (from the rear) panel insulator or to the frame of the variable condenser for a ground connection. This lead may be clearly seen in the rear view, Fig. 4.

The lower edge of the chassis is about 1" from the bottom of the panel so that there will be plenty of room for the grid coils which are soldered directly to the grid terminals of the 4-prong isolantite socket.

An illuminated meter serves as a pilot lamp and shows the power input. A heavy duty toggle switch and a closed circuit jack are the other items on the panel. A third stand-off insulator, which is unconnected, serves as a bottom support for a vertical antenna.

Heavy wire, no smaller than No. 10, should be used for all low voltage connections beneath the chassis and to the battery, as the heavy current will cause considerable voltage drop in lighter wire.

If the coils are properly made the outfit should work at the first try. Connect a 25-watt lamp bulb to the output posts and vary the coupling until highest brilliancy is obtained. The bulb should light up almost fully with a current of 100 ma. on the meter. The output will drop slightly as the condenser plates are opened and the plate current will rise.

When a doublet antenna is employed the two upper terminal posts are used for output and the clip is naturally placed as shown in Fig. 4. With a vertical antenna as in Fig. 2, the clip is grounded. Thus, practically any type of antenna or feed system may be employed.

The power unit used here is rated at 325 V. and 125 ma. output and the tube may be operated for short periods at 100 ma.; as a general rule the plate current should be kept at 90 ma. The high voltage will run about 400 V. at 90 ma. current, giving a power input of about 36 W.

The RK59 is designed for operation up to about 45 W. input using 500 V. at 90 ma., however. Other dual triodes such as the RK34 and 6E6 may be used in this transmitter, but of course at considerably lower power input and output.

It is absolutely essential to check the frequency of operation whenever the set is used since it can be shifted so easily. Mark the dial with the 52-meter band limits and often check the frequency with an accurate meter.

Those who work with radio control have of necessity to carry much equipment with them, including several meters for checking batteries and receivers. An effort has been made to combine all measuring equipment into one compact unit, with the result as shown in Fig. 5. The ranges are as follows: 10 V.—50V.; 10A.—50A.; 1 ma.—10 ma. There is also a simple arrangement for checking continuity of spark coils, etc. The latter is used in conjunction with a 3 V. battery, such as that used for ignition, and while the meter is not calibrated in ohms, a few tests will soon show how much reading a coil or other part should give. The circuit for this purpose is similar to that of an ordinary ohmmeter.

For the ampere readings, used to check dry cells, a special shunt is used. This came from the factory about 7" long, but in order to get it in the small case it was sawed in half at the center copper connection block. One section then runs across the bottom of the panel and the other up the right side, with tip jacks at each end and at the center.

The 10 ma. shunt and the other three resistors are mounted on a small bakelite sub-panel which is fastened to the bottom of the three-way switch and one meter mounting bolt.

The panel measures 3" x 6" x 1/4" and the wooden case is 2-3/4" deep.

Although other ranges could be used, it is felt that those chosen are adequate for most. Thus the milliamperes ranges are for use in checking relay current in radio control receivers of various types. The voltage ranges cover most batteries used for ignition and receivers, while the ampere ranges are mainly for checking dry cells of various sizes.

In connection with the latter, it should be mentioned that ampere readings on all types of cells will be somewhat less than with the ordinary watch-case style of meter. This is because of the extremely low resistance of the ammeter circuit used here as compared to the internal resistance of the cheaper type of meter. It will be found that good penlite cells will read about 4-6 A; large size (type D) flashlight cells, 6-8 A and No. 6 dry cells about 20A. A few checks with cells of known quality will soon show what reading may be expected for various common sizes. As with the cheaper meter, only a single cell should be tested at a time; the leads should be held on just long enough to get a reading, not a moment longer. Quick readings are easy, however, for this type of meter swings to the proper scale position immediately and without any wiggling back and forth.

In order that reader preference may be noted, it is suggested that those who wish

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Ranger \$1.50

Holding National "Open" Record

Primarily a Class B, the RANGER is a Class A when used with the Megow 199 Motor shown here. Span 46". Wing area, 325 sq. in. Weight, ready to fly, 18½ oz. Complete with motor, wheels, propeller, flight timer and kit, \$15.75. Kit only, \$1.50. Motor only, \$12.50.

AeroChamp



New type designed to take the 199 motor shown above. Easy to build. Small, light and sturdy for safe landings. Span 46 in. Kit E-21, less wheels and propeller, 95c. Complete with motor, wheels, prop., kit and flight timer, \$14.95.

Sorring Eagle \$2.95



3-unit construction, easy to build, transport and fly. Marvelous in performance. Climbs at steep angle, flies without hanging on propeller. Low-mounted wing—no tendency to loop. Class A. 46" span, for any "A" motor. Fin. prop. \$2.95. Class B. 54" span, for any "B" motor. Fin. prop. \$3.95. Class C. 6 ft. span for any 1/5 h.p. motor. Fin. prop. and puncture-proof wheels, \$4.95.

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Puncture-Proof. Very resilient.

2½ in. per pair, 45c . . . 3½ in. 55c

X-ACTO Refill-Blade KNIVES—Interchangeable blades. Many types available.

No. 1. Small knife, 1 blade, 50c

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5 extra blades, assorted or one style, 50c

ALL-METAL BATTERY HOLDERS—

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Fits almost any ¾" motor.

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"WIZ" PROPELLERS

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PARTS

Fig. 3. Tube—Raytheon RK59; R1—IRC 5,000 ohms, R2—50,000 ohms, 25 Watt wired wound; C1—Cornell-Dubilier 8 mf. electrolytic No. KR608, C2—.01 mf. mica, C3—Bud dual 75 mmf. No. MC1884. Power supply—ATR No. 6A; Case—Bud No. CC1100; Chassis—No. CB37; Choke—No. CH925; Socket—No. S954; Dial—No. D1732; Jack—No. J1325; Insulators (4)—No. I1911; Meter—Triplett 200 ma. rear illuminated No. 227A; L1, 6 turns No. 14, 1-1/4" long and 3/4" OD.; L2, L4, 4 turns 1" long each, 3/4" O.D.; L3, see text.

Fig. 6. Meter—Triplett No. 223, 1 ma. movement; R1—10 ma. shunt; R2—10 V. series resistor; R3—50 V. resistor; R4—3000 ohm 1/2 W. resistor; R5, R6—10-50 A. shunt; SW1—3-position switch.

Fly Them On A String

(Continued from page 25)

types of gas models such as American Junior's "Fireball" can be developed for indoor flying.

As proof that American modelers may be temporarily downed, but not licked, by present restrictions on armory flying, we cite the case of the Junior Aviation League of Boston. For years the J.A.L. has been holding indoor meets twice a month during the winter season in the South Armory in the historic Back Bay section. Came National Defense and the armory in full time use by the military forces, so J.A.L. leaders were required to

look elsewhere for an indoor flying spot. First the scene of the indoor meets was shifted to the gymnasium of Tufts College in Medford, Mass. Then League director Gunnar Munnick hit upon the brilliant scheme of holding meets in auditoriums and gyms of high and junior high schools throughout greater Boston. The meets were combined with "demonstration" flying and students at the different schools were given the opportunity to witness or participate in the meet, thus learning more of the club and benefits it offers to modelers in Boston and environs.

The Boston plan has proved so successful we pass it along here as "food for thought" for all indoor devotees and club leaders.

Our Canadian neighbors have always found it difficult to secure proper indoor flying facilities. John Dilly and Jeff Harris were glad to get inside an armory or large auditorium once or twice a year; yet their interest in such models, as well as their interest in outdoor flying, never wavered. Result was that when they did fly in large buildings at American or Canadian "Nationals" they didn't waste any time and utilized every moment to get their models in perfect flying trim.

Our nominee, however, for the indoor hall of fame is Curtis Janke of Sheboygan, Wis. Curtis has placed high in national indoor events as well as in many regional battles such as Bob Sommers' annual Mississippi Valley-valley-good meets. At one time Mr. J. confided that the only time he could do any serious indoor flying was in national and regional contests; seems there were no available places in his home town in which he could

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New 1/2 oz. PER PAIR

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3" Balloon Wheels \$1.00

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Beware of Inferior Wheels built to look like M&M's



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M & M's New 2⁵/₈" WHEELS Designed for SMALL GAS MODELS ONLY \$0.95.

M & M 3¹/₂" Gas Wheels—New only \$0.50. Air Mail Add 17c.
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Follow the lead of the English aero-modelers, the Dillys, the Harrises and the Jankes: "More model airports" is our motto—and we mean indoors as well as outdoors.

Fokker D-8 Flies Again

(Continued from page 21)

to the right. Under more favorable flying conditions it should give an even better account of itself, since it attains enough altitude to take full advantage of rising currents.

Before construction can be started, it will be necessary to enlarge some of the plans to full size; with the exception of the full size fuselage formers and wing ribs most parts are shown one-third full scale. Obtain a large sheet of ordinary wrapping paper and "scale-up" the plans to actual size. A pair of draftsmen's dividers will simplify the task since it will only require "stepping-off" each dimension three times. When duplicating the side view of the fuselage, the top line of the upper longeron should be used as the reference line since it is straight. In duplicating curved parts such as the rudder, draw squares of the indicated size and then draw the curved line through the corresponding positions. Now for the actual construction.

Fuselage

The fuselage is of standard construction. Build two side frames using ROCK HARD 3/16" sq. balsa for the longerons and cross pieces. Build one side atop the other to insure that they will be identical. When the sides are dry, remove them from the plan and turn them up-side-down over the top view. Pin them the proper distance apart and cement cross pieces to place, being careful to keep the whole structure lined up evenly.

Fuselage formers come next. Make complete paper patterns of each and then cut them from 1/8" sheet balsa. Two each of formers 1S, 2S and 3S are required. Cement the formers to their respective places. The fairing strips are medium grade 1/8" sq. balsa. It will be noted that many of the formers lack notches so when this is the case, the fairings are cemented directly to the sides as shown. The cockpit is made of 1/16" sheet. Cement several sheets together so the stock will be wide enough and then cut out the center to the shape indicated. The cockpit piece is then fitted accurately into the space between formers No. 4 and 5 and cemented fast.

The tapering strips that give the stabilizer its correct incidence are shown on the plan. They are 3/16" wide and taper from 3/32" to zero. Two are required and they are glued to the fuselage with the 3/32" end at the rear.

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It shows 2 methods of building round fuselages—
It gives nine methods of building wing frames—
It tells about the different covering materials—
It shows how to cover round fuselages with ease—
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and it contains over 100 illustrations.**

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Landing Gear

Landing gear struts are formed to the size and shape shown. 3/32" diameter music wire is used for the front strut while 1/16" diameter wire is used for the rear. A vise is very helpful for bending the wire but heavy pliers can be used if necessary. Bend the struts accurately and note how the rear one is bent to join with the front.

The struts are solidly attached to the fuselage structure—the spring of the wire being sufficient to absorb the shock of landings. Use strong thread or light twine for the purpose of binding the struts to the cross pieces and longerons, and then apply several coats of cement. The 3/16" sq. diagonal ones shown on the plan are cemented to place once the landing gear is attached. Join the two landing struts with solder. Two No. F-1 reinforcements are cut from extremely hard 1/8" sheet balsa; cut the several notches so they will fit accurately over the cross members of the fuselage and landing gear wires. Cement these to the bottom longerons and uprights to strengthen the fuselage.

Fairings on the landing gear struts are simply soft strips of 1/16" sheet balsa, attached to the wire by strips of tissue wrapped spirally around both. These should not be attached until the fuselage is covered, however.

Because of the unusual size and shape of the wheels it will be necessary to make each of them from three discs of very hard 1/4" sheet balsa that have been laminated together. If the builder has access to a lathe it will help, but the wheels can be shaped accurately with a sharp knife and some

sandpaper. Bushings of some sort must be used to permit free and accurate turning. If the wheels are covered with silk they will be greatly strengthened.

Wing Mount

While construction of the wing mount is not difficult, it must be made with the greatest of accuracy. The three cabane struts are shown in detail and all are made from 1/16" diameter music wire. Make accurate full size sketches of each strut and then use them for patterns to aid in shaping. Note the side view of each strut to determine how the ends are bent. Attach the front and center members to their respective positions on the fuselage; strong thread is used to attach them to the longerons. Ends are adjusted to meet accurately and then they are soldered together.

Attach the rear struts. Next select two pieces of 1/4" sq. white pine for the wing rests; neatly attach the pine pieces to the struts with thread wrappings. Once the wing rests are in place they should be checked for correct incidence. If the top of each pine strip is exactly parallel to the top fuselage longeron, it is correct; but if it is not, it must be removed and the proper adjustment made to make it exactly right. This is very important. Apply several coats of cement to all thread bindings and joints once the wing mount is properly aligned.

As shown on the side plan, triangular shaped reinforcements are used to strengthen the upper longeron at the wing mount. Cut these gussets from medium grade 1/8" sheet balsa and then cement them to place at stations No. 1 and No. 3. To

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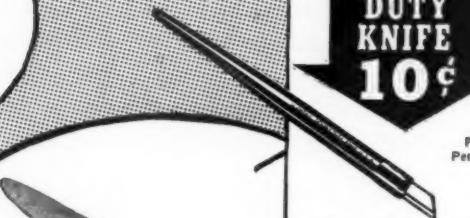
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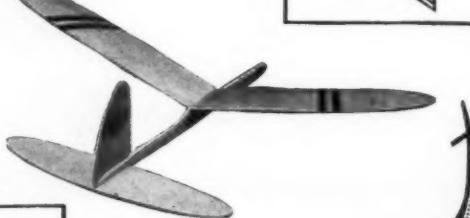
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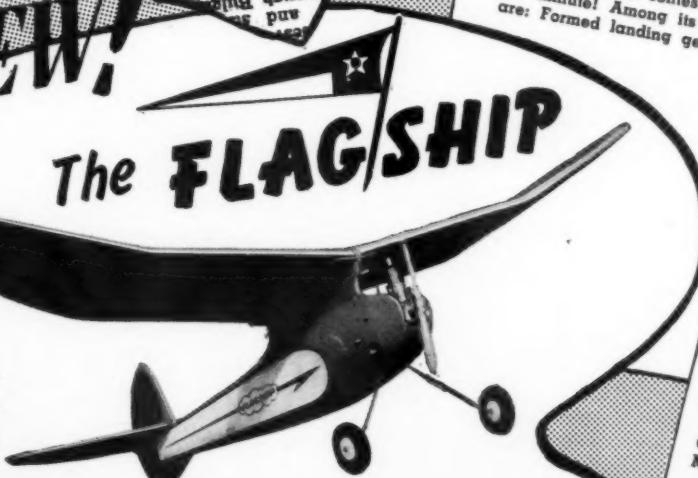
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strengthen the fairing strips to which the false struts are later lightly attached, it will be necessary to glue triangular shaped $\frac{1}{8}$ " thick strengtheners to the back of the first bulkhead as shown on the pattern for the fuselage formers. After the wing is completed the tops of the wing rests are fitted with pieces of balsa strip so they will conform to the curvature of the wing's under surface. The cabane strut fairings, small blocks to prevent wing sliding, false struts, etc., are completed later.

must be worked out to suit each individual case. Four small hooks bent from .040 music wire are cemented to the front of the engine bulkhead so rubber bands can be wrapped about them and the wing and landing gear struts to hold the engine unit in place.

The concluding installment for building the Fokker D-8 will be published next month.

Academy of Model Aeronautics

(Continued from page 29)

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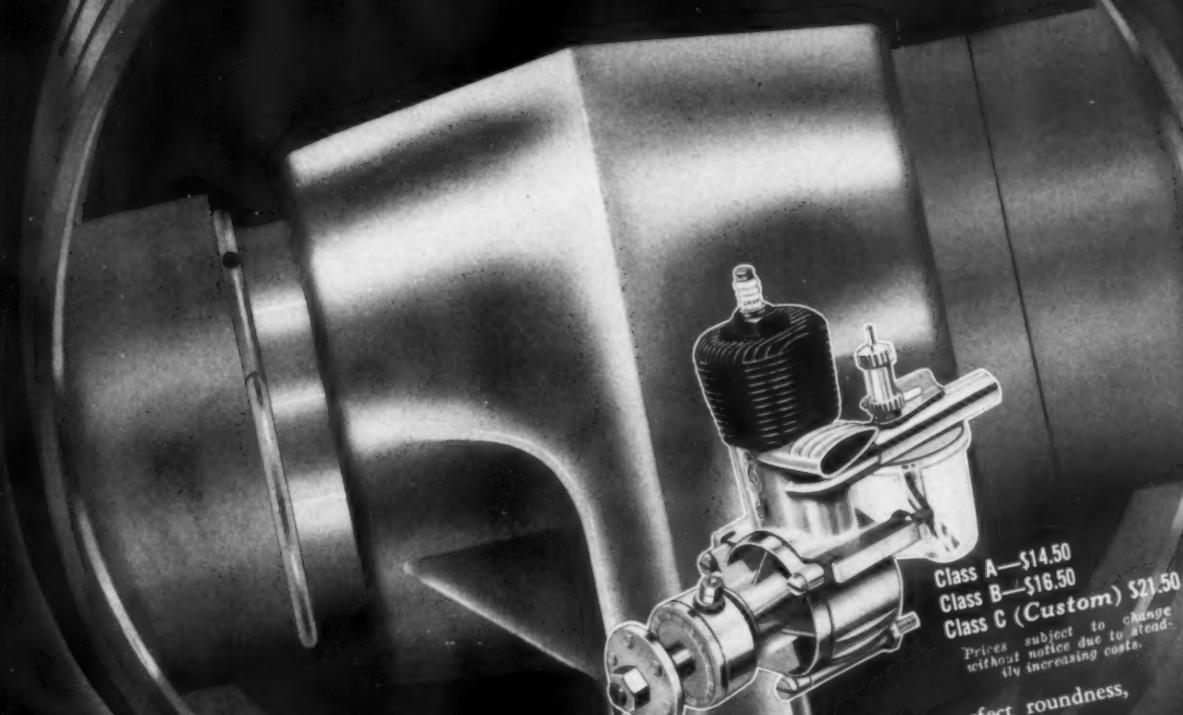
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**FINANCIAL STATEMENT FOR THE YEAR
ENDING DECEMBER 31, 1940**

Income

Membership dues and licensing fees.....	\$ 7,892.50
Sale of supplies including official manuals, license numerals, decalcomanias, pins, etc.	961.66
Affiliated Club Fees.....	370.00
"Coordination Bulletin" subscriptions.....	274.90
Gas model insurance fees.....	89.00

Expenses

Printing and distributing "Coordination Bulletin".....	\$ 314.55
Gas model insurance fees (paid to Brown-Crosby Insurance Co.).....	895.00
Miscellaneous expense.....	136.25
Salaries paid to Executive Director and Secretary, Technical Director, Secretary-Stenographer and Clerical help.....	4,201.14
Telegrams and telephone.....	100.12
Postage.....	943.19
Office Supplies.....	801.31
Rent.....	275.00
Travel.....	341.11
Membership supplies.....	1,947.48
Express.....	70.88
Printing.....	401.67
Membership solicitation.....	952.41
N A A affiliation fees.....	330.79
Total income for year 1940.....	\$11,710.50
Total expense for year 1940.....	\$10,393.16
Expense in excess of income.....	1,317.34
Balance on hand January 1, 1940.....	235.09
Due N.A.A. December 31, 1940, for Monies paid out by N.A.A. for A.M.A. 1,082.25	

These figures are from the N.A.A. financial statement for year 1940 certified to by James A. Councillor & Co., Washington, D.C., certified public accountants.

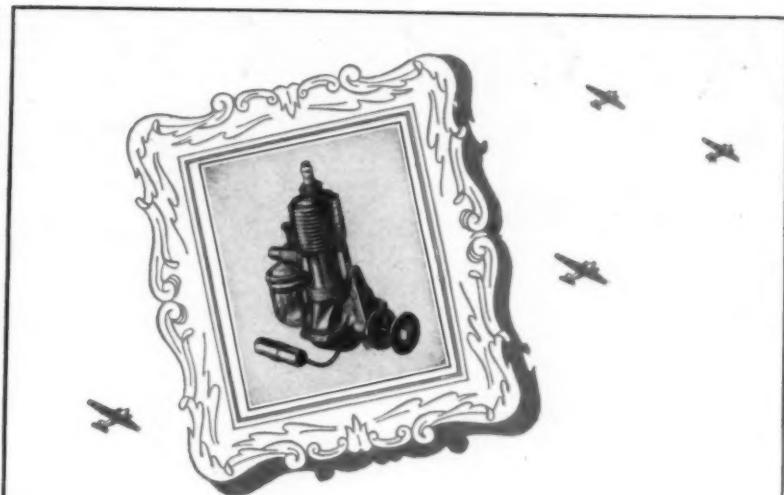
In conjunction with this financial statement of the Academy of Model Aeronautics, it is desirable to point out several factors indicative of the rapid growth of the A.M.A., and the wide acceptance it has been accorded by model leaders and flyers. At the time this statement was prepared, an inventory at National Headquarters showed the A.M.A. had on hand \$1,624.95 in official supplies (sale price) and office supplies (cost price). Although some of this material may be subject to depreciation and although postage is required for sending out individual items such as manuals, by comparing the inventory total and the monies owed N.A.A., it is apparent that the Academy IX at the beginning of 1941 had about \$500.00 to its credit, or more than twice the amount than in January, 1940.

Also the property of the Academy is about \$300 worth of filing cabinets, magazines, books, photographs and office equipment. Much of this, such as books now out of print, and exclusive photographs, is worth many times more than the original cost.

These figures reveal that the Academy is moving steadily forward, following the straight and narrow path of financial security and is not top-heavy with large salaries and expensive promotions.

Those who joined the Academy in recent months will be interested to know that the A.M.A. took over the work of the N.A.A. Model Division in April, 1940, and since that time has been administering the sanctioning rights of the National Aeronautic Association in the aeromodeling field, under N.A.A. approval. For this privilege—the right to sanction meets and license model flyers—the A.M.A. allots 10% of its licensing and sanctioning fees to N.A.A. under terms detailed in the A.M.A. by-laws. In addition, a small rental fee is paid N.A.A. for headquarters office space and stock-room privileges as well as the use of all addressing, mimeographing and other mechanical office and organizational equipment which permits the A.M.A. to operate at minimum cost.

In 1939 the N.A.A. Model Division had an income of \$4,676.00 and a total expense of \$3,747.98. This expense did not include rent, overhead, tele-



Belle of the Sixties

The class "C" event under the Academy of Model Aeronautics* rules, is for engines of point sixty cubic inch displacement or over. Years before there was such a thing as class "C" or even the A.M.A., the first motor to be produced for use in model airplanes was a Brown Junior Motor.

As time went on, other motors were put on the market and their displacement was based on that of the Brown Junior Motor. When rules were established this point "sixty" displacement was used as a standard for that category. The Brown Junior Motor had set that standard!

Today, the model D motor, at \$12.50, is still the performance standard of that class. Rugged, powerful and dependable, it is the choice of expert gas modelers and contest champions. It has no fancy frills, and frankly, our engineers weren't thinking of Lana Turner when they designed it. Nature intended an orchid for beauty, but an elephant is the symbol of power.

We think there is something in that. You will, too. For give a model D the "gun" and it leaps into action like a thing alive—smooth, roaring, powerful action that masters the air with delightful ease.

If you want a season chock full of *real flying fun* . . . if you want trouble-free performance and ease of starting . . . if you want reliability plus that extra wallop on a take-off . . . then face facts.

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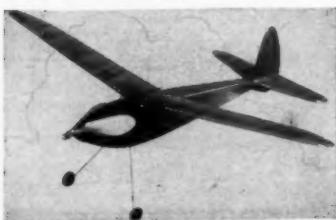
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phone, office supplies or any items other than specialized materials purchased exclusively for that division of N.A.A. The model activity now set up under A.M.A. direction can pay its own way, a possibility previously challenged by some leaders who contended that the model aeronauts of America could not support a governing body by themselves. These critics have been proved wrong by the accomplishments of the Academy, which to date has received no subsidization from any source. This exceptional record is a tribute to the loyalty, foresightedness and convictions of those individuals who have maintained interest and membership in the Academy during the past seven years.

The Army Flies "Blind"

(Continued from page 7)

tendency to stall in any of the types tested. Therefore, it could be assumed that any type of airplane in a level attitude would be in a safe flight condition with any position of throttle setting. While in this same level attitude condition, the throttle was moved forward until zero rate of descent was obtained and this throttle position, as well as the positions of the longitudinal axis, propeller pitch, flap angle and landing gear position, was considered the slow cruise condition. The throttle was then retarded to a position at which 400 feet per minute rate of descent existed, the attitude of the plane, propeller pitch, flap angle and landing gear position remaining the same as in slow cruise. This was assumed to be the desirable glide or let down condition. At this point the air speed was noted, although the tachometer reading was disregarded. In order to obtain the safety factor above stall conditions, the pitch angle was slowly increased until the airplane stalled. Again the air speed was noted, although no tachometer reading was taken. An astounding fact became evident in that the difference in air speed between the level attitude position during let down and the air speed at stall was approximately 20 miles per hour, regardless of type of plane or altitude at which tests were being flown. In addition, this stalling speed was found to be approximately 5 miles per hour less than rated stalling speed with fully retarded throttle. This decrease in stalling speed can be easily explained as being due to the straightening out of the airflow around the fuselage and the entering edge of the wings, as well as the decreased wing loading caused by the vertical component of the small amount of thrust obtained at this partly-open throttle condition.

At this point, it might be well to explain the method by which the best flap angle was obtained. Each ship mentioned above was taken to altitude, the flaps lowered to 50% of the total flap movement, and the plane placed in the let down condition. After noting the air speed, it was then placed in a stall and the air speed again noted. Following this, same tests were flown at the same altitude with a ten degree increase in flap position, the two air speeds again being noted. The test was again repeated with a ten degree decrease from the 50% position of the flaps and, as above, the two air speeds were noted. In this manner, it was possible to bracket the best position of the flaps for let down. The best flap angle was found to be not necessarily the angle at which the slowest forward speed would be obtained during let down,

as two values were desired. These values were a reduction of approximately 5 miles per hour in the stalling speed and approximately 20 miles per hour difference in air speed from the level attitude position and the stall position, with the throttle set for let down conditions. In all the tests conducted above, it was found that when in a stall the small plane contained in the artificial horizon was in a position well above the artificial horizon, a position the pilot would never dare permit the small airplane to assume under normal conditions.

Although there appears to be sound aerodynamic reasoning for the existence of these approximately constant values, no direct formula has been derived due to insufficient time to complete the study. However, these phenomena are now being studied and, upon completion, results will be submitted as a supplement to this paper.

The fact that these constant values do exist is of immediate and tremendous importance in executing an instrument landing by use of any type of instrument landing equipment. This is true due to the fact that when the airplane is placed in the let down condition the air speed will always be at least 20 miles per hour above stalling speed; when in slow cruise condition, the safety factor above stall is still greater.

It is obvious that at airdromes of high elevation a more advanced position of the throttle would be necessary to maintain a rate of descent of only 400 feet per minute. This, of course, would increase the true air speed during let down. However, tests flown at altitude proved the true air speed at stall was equally increased and that the difference in airspeed between the level attitude position and stall position was still approximately 20 miles per hour with the throttle set for let down conditions. In like manner, the stalling speed was still found to be approximately 5 miles per hour less than the rated stalling speed with the throttle completely retarded at this altitude.

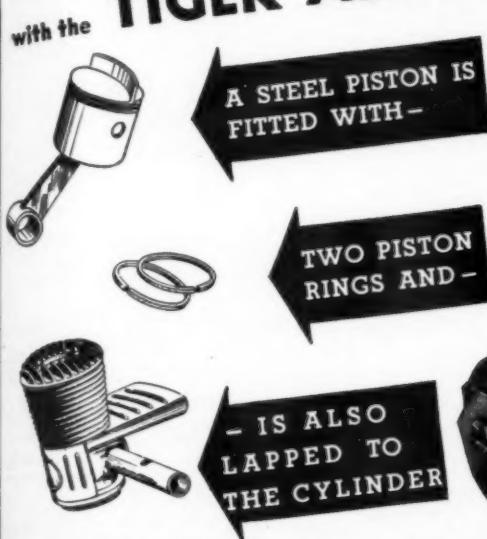
When it was found that these approximately constant values actually exist, it became evident that instrument flight could be made simpler and easier to accomplish. In other words, to obtain normal slow cruise conditions, the propeller may be set at low pitch, flaps placed at the predetermined desired position, landing gear lowered, airplane placed in a level attitude, and the throttle manipulated until zero rate of climb is maintained. It is immediately evident that in accomplishing slow cruise in this manner, both the air speed indicator and the tachometer may be disregarded, as the pilot is assured the air speed being flown is well above that of stalling. Also, due to the fact the rate of climb and altitude of flight are being controlled, a constant altitude and air speed may be held within much smaller limits.

When in let down condition, air speed and tachometer readings may still be disregarded, as the pilot may know that the air speed being flown is approximately 20 miles per hour above stall. For the same reasons given above for slow cruise conditions, air speed may be held constant within much smaller limits than is possible with former methods of "blind" flight.

Obviously, an automatic pilot, if properly controlled manually or controlled automatically in conjunction with allied auto-



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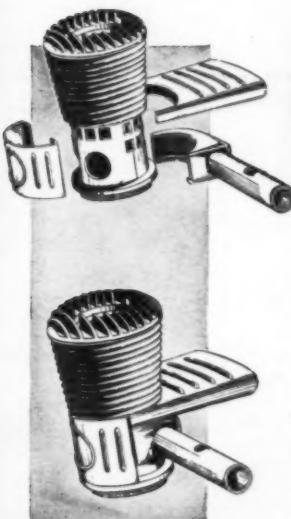
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matic equipment, could maintain the flight conditions required for both slow cruise and let down much more accurately than would be possible by the human pilot.

In this discussion, the conditions required for slow cruise will be considered first. To establish these conditions through manual control of the automatic pilot, the landing gear is lowered, propeller set for low pitch, flaps lowered to the proper predetermined angle, the plane brought to a level attitude by use of the climb control knob of the automatic pilot, and the throttle moved to an approximate position where zero rate of climb will be obtained. Due to the lag in the rate of climb instrument, minor adjustments in the throttle position must be made to establish zero rate of climb. Directional control is, of course, obtained by use of the turn control knob of the automatic pilot.

Slow cruise conditions may also be established through use of the automatically controlled automatic pilot and allied automatic equipment. This may be done in the following manner: The airplane is first trimmed for level attitude. Automatic directional control is gained by introducing a sensitive relay between radio compass output and turn control knob of the automatic pilot. This causes it to be flown directly toward the radio transmitter upon which the radio compass is tuned. The remaining control must necessarily be that of the throttle. This is accomplished by a throttle control unit which quickly moves the throttle to a position at which the rate of climb is approximately zero. At this point, a vernier control of the throttle control unit, operated by the rate of climb control and necessarily operating at a slower speed than rate of climb may act, further adjusts the throttle position in order that an exact zero rate of climb may be obtained. Due to lag in the rate of climb instrument, it is, of course, undesirable to have the throttle follow the rate of climb control throughout the throttle's entire movement, as obviously this would necessitate too great a period of time for each major change in throttle position. It will be well to mention that all the controlling mechanism throughout the entire automatic landing system is designed to function at a slower rate than the mechanism which is being controlled can react. This is done in order that no hunting will be experienced due to over-control.

Let down conditions may also be established by manual control of the automatic pilot. To accomplish this, the position of the landing gear and flaps, setting of the propeller pitch, the flight attitude of the airplane will remain the same as is found in slow cruise. The throttle is retarded manually to a position at which approximately 400 feet per minute rate of descent is established. Further minor adjustments of throttle position are made in order that a rate of descent of exactly 400 feet per minute as shown by the rate of climb instrument may be established. As was the case in slow cruise, control of direction is secured by use of the turn control knob of the automatic pilot.

Automatic control to establish proper let down conditions may be accomplished in much the same manner as was done in automatically establishing the slow cruise conditions. The flight attitude still remains

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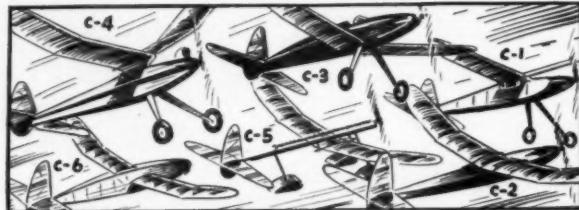
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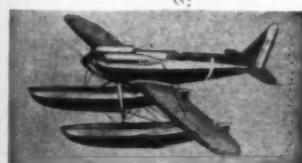
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level. Automatic directional control is again maintained by properly interlocking the output of the radio compass through a sensitive relay to the turn control knob of the automatic pilot. The throttle control unit causes the throttle to be moved quickly to a position at which a rate of descent of approximately 400 feet per minute exists. The rate of climb control, through the throttle control unit, again makes slight adjustments in the throttle position until the rate of descent is exactly 400 feet per minute. Another application of the vernier control of the throttle control unit is its use on any type of vertical glide beam. If the glide path indicator is substituted for rate of climb indicator, the throttle will be moved quickly to the approximate desired position and the vernier adjustment of the throttle control unit, controlled by the glide path indicator, would make minor adjustments in the throttle control unit in order that the plane, by varying the rate of descent, could be held on the glide path.

Control of altitude constitutes another phase of instrument landing which may be accomplished either manually or automatically. There is a definite altitude at which it is desirable to begin the flight pattern for an instrument landing when using any of the various types of instrument landing systems. To reach this altitude by manual control, the airplane may be placed in a let down condition until the above-mentioned desired altitude is reached. At this altitude, slow cruise conditions may be resumed until the ship is at a position, with respect to the landing field, at which it is desired to begin the let down for landing. Again, there is a minimum safe altitude which must be maintained during let down until the airplane reaches the landing area boundary. If, during the let down for landing, the plane reaches this minimum safe altitude before passing over the boundary of the landing area, it is again placed in a slow cruise condition in order that a decrease in altitude, below that considered a safe minimum, will not occur. Upon reaching the boundary of the landing area, let down conditions would again be resumed until it makes contact with the ground.

The entire control of altitude may also be accomplished automatically. This is done by having the automatic altitude control place the plane in slow cruise or let down conditions, as it becomes necessary. In other words, if at the beginning of an automatic landing the ship is above the desired altitude at which to begin the flight pattern for landing, the automatic altitude control causes it to assume let down conditions until this desired altitude is reached, at which point slow cruise is resumed. When the plane is in a position to begin the let down for landing, the automatic altitude control no longer functions and it assumes the let down condition. When the plane reaches minimum safe altitude for let down approach, the automatic altitude control again places it in a slow cruise condition until the landing area boundary has been reached. At this point the automatic altitude control is again rendered inoperative and allows the ship to assume the let down condition in order that it may make contact with the ground.

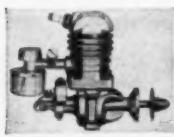
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numerous changes must be made, such as changes in tuning to various ground radio facilities and change from slow cruise to let down approach. This, of course, may be accomplished by tuning manually to various radio facilities, as it becomes necessary, and manually changing from slow cruise to let down condition when the desired point to begin the let down approach has been reached. Through use of marker beacon projectors, which constitute part of the ground equipment of practically all instrument landing systems, automatic control of the above operations is obtained. The marker beacon projectors are placed in definite locations at which these changes are desired. The output of the marker beacon receptor, installed on the airplane, is connected to a relay which causes a frequency selector to tune automatically the radio compass to ground radio facilities used in automatic landing. This relay also controls the functioning of various items of automatic equipment as they came into use during procedure of automatic landing; also changing the plane from slow cruise to let down condition at the exact point desired to begin let down approach.

Automatic landings may be accomplished on any of the various types of instrument landing systems. During tests conducted at the Materiel Division in automatic landing, the standard Army Instrument Landing System was used. Four army standard low-frequency radio compass guiding stations shown in Photographs Nos. 1 and 2, consisting of small transmitters tuned to slightly different frequencies, are placed in line with the runway to be used, as shown in Photograph No. 3. No. 1 station is placed at a point about five miles from the landing area; No. 2 station is placed at a point about 2 miles from the landing area; the third station about 1300 feet from the field boundary; and the fourth station at the opposite end of the runway from the entering end. Each of these stations is also equipped with a standard "Z" type marker. This constitutes all ground equipment used for automatic landing, other than usual communications equipment regularly found on any airdrome or airport.

When the airplane is flown within twenty miles of Station No. 1 through use of radio range or other navigational methods, it is trimmed to a level attitude position, landing gear and flaps lowered and propellers set for minimum pitch. The master switch is then closed, regardless of the airplane's direction of flight. The automatic tuning device, shown in Photographs Nos. 4 and 5, tunes the radio compass to Station No. 1, which, through a relay shown at "A" in Photograph No. 6, rotates the turn control knob of the automatic pilot until the ship is headed directly towards this station. At the same time, the altimeter control, shown in Photographs Nos. 7 and 8, causes the throttle to be retarded to the let down or glide position, through the throttle control unit shown in Photograph No. 9 until the plane reaches an altitude of 1000 feet above the runway. When this altitude has been reached the throttle is moved automatically by the throttle control unit, back to the slow cruise position and level flight is maintained by the use of the rate of climb control, shown in Photograph No. 10. This control unit makes minor adjustments in the throttle position

until a zero rate of climb is established. When directly over Station No. 1, the "Z" type marker located at this station, through the marker beacon receiver shown at "B" in Photograph No. 6, actuates a relay, which in turn causes the automatic tuning device to tune the radio compass to Station No. 2, thereby causing the airplane to be turned and flown towards this latter station. In the meantime the altitude control is causing the throttle to be placed in such a position that constant altitude will be maintained. The rate of climb control is also aiding in controlling the throttle in order that zero rate of climb may be maintained. After passing over Station No. 2 the relay is again actuated by the marker beacon which in turn causes the radio compass to be tuned to Station No. 3. This same relay causes the altimeter control to be made inoperative and the rate of climb control to be shifted from zero rate of climb to a rate of descent of 400 feet per minute. At this point the above-mentioned relay also causes the throttle to be moved to an approximate position where 400 feet per minute rate of descent will be maintained. The rate of climb control further adjusts the throttle until exactly 400 feet per minute rate of descent is established. Should the airplane at any time between Station No. 2 and Station No. 3 reach an altitude of 200 feet above the runway, the altimeter control is again brought into play and causes the throttle to be moved forward until slow cruise is again obtained. Again the rate of climb control makes a final adjustment of the throttle position until zero rate of climb exists. This condition is maintained until it passes over Station No. 3. As was the case when passing over Stations Nos. 1 and 2, the marker beacon again operates the relay and tunes the radio compass to Station No. 4 which is located at the opposite end of the runway, thereby maintaining direction of flight of the airplane down the runway. This relay also causes altimeter control to become inoperative and throttle to be again moved to the approximate let down position. This throttle position is again adjusted through the rate of climb control to a position where exactly 400 feet per minute rate of descent exists. Upon contact with the ground, the landing gear switch, shown in Photograph No. 11, is operated and the relay which is energized by this switch, being a locking type relay, causes the throttle to be moved to a fully closed position upon first contact with the ground. This locking relay also causes the brakes to be applied gently in order that the automatic pilot will still be able to control the plane down the runway during the roll.

Today there is a greater demand than ever before for increased speeds, a reduction of weather limitations, increased load carrying capacities and an increased safety factor in the operation of aircraft. These demands cause the performance requirements for aircraft, power plants and all other allied flying equipment to daily become more and more rigid. These advances in design necessarily increase the number of controls essential to proper operation of this equipment. As the overall improved performance makes greater and greater demands of the flight personnel, the functioning of these multidinous controls has been made automatic wherever possible. Now that automatic landing is an accomplished fact,

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GRUMMAN F5F1 FIGHTER



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NORTHROP A-17 ARMY FIGHTER



24" Span. Length 16 1/2". 1/2" Scale

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it is well within the realm of reason to visualize an airplane taking off from an airdrome, flying to its destination and landing, the whole being accomplished completely automatically; thereby relieving the flight crew of all duties other than observing instruments to see that the equipment is functioning properly.

Model Designing Simplified

(Continued from page 11)

line S, intersecting it half way between the wing tips thus it will be 6" from the left vertical line. Extend this line upward for approximately 6½" and downward for 3½". As it is a construction line similar to S, it may be dotted.

5. Lay out the tail moment arm marking a point on the longitudinal axis L, 5¼" above line S. Through this point, draw a horizontal line perpendicular to axis L, extending 3" on either side of it. This is the center line of the stabilizer.

6. Lay off the nose length on the center line L below lateral axis S. This length is to be 5½" so a point should be marked on center line L, 2¾" below line S. A horizontal line drawn through this point will indicate the nose of the fuselage.

7. The stabilizer span is to be 10" therefore draw two verticals intersecting the stabilizer center line T through points 2½" on either side of axis L. These two verticals represent the tips of the stabilizer. The distance between them on the drawing will be 5", giving a 10" span.

8. The chord of the stabilizer is to be 3" so draw in lines representing the lead-

ing and trailing edges of this surface, one ¾" above and the other ¾" below axis T.

9. Draw in the center line of the propeller. The propeller depth is to be 7/8" and the distance of the rear hub from the nose of the fuselage should be ¾". This space is to be taken up by the propeller bearing, therefore, on the drawing the center line of the propeller should be drawn horizontal, perpendicular to the axis L, 9/32" below the line representing the nose of the stabilizer.

10. To establish the propeller diameter, mark off a distance of 2½" on each side of axis L. Draw verticals through these points which will locate the propeller tips. Then draw in the leading and trailing edges 7/32" from the center line.

11. Establish the forward position of the wheels. The wheel axles should be ¾" forward of the wing center line, therefore, a horizontal line representing the axles of the wheels should be drawn perpendicular to axis L, 1¾" below axis S. This line should extend on either side of axis L at least 2".

12. The tread of the wheels should be about two thirds the diameter of the propeller so in this case we will make it 6". To locate the wheels draw light vertical lines 1½" on each side of axis L intersecting the line representing the wheel axles.

Now you have completed the general plan view which should appear as "A" Diagram No. 3.

Next lay out the side view. This will be placed in the upper right hand corner with the longitudinal axis of the fuselage running vertical on the drawing, parallel to its

vertical projection L in Figure "A."

13. This represents the thrust line and should be located 3¾" from the right border line of the drawing and should be approximately the same length as L in Figure "A."

14. Now project axis S and T across to the right so that they intersect this thrust line. This will indicate the center line of the wing and stabilizer in the side view.

15. The nose length is marked off by projecting the line at the nose of the fuselage across to the right until it intersects the thrust line in the side view.

16. In the same manner project the center line of the propeller across to the thrust line and indicate the rear and front faces of the hub by two short lines. These should be 7/32" on either side of the propeller center line.

17. Mark off on the latter the propeller diameter as in the plan view "A".

18. The next step is to draw in the wing chord, this is to be located 1½" above the thrust line; on the drawing represented by a line drawn through a point ¾" to the left of the thrust line L'.

19. The wing chord is to be at an angle of incidence 3¼° therefore the chord line should be drawn through this point on axis S projected at an angle of 3¼° to thrust line L'. The degrees may be measured with a protractor or by measuring a rise of 1/16" in 4" for every degree. When you have drawn this line, mark off a chord of 3½" by projecting the leading and trailing edges of the wing in the plan view to the right until they intersect the chord line in the side view. The intersection will represent the leading and trailing edges in this latter view.

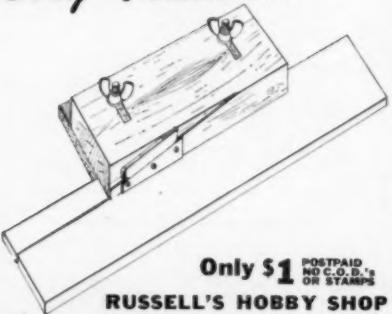
20. To draw in the side view of the wing, draw lines perpendicular to the chord lines upward from the points representing the leading and trailing edges. The wing tips are to be raised 1½", therefore, on the drawing the line representing the tips should be drawn parallel to the chord line ¾" above it (to the left of it on the drawing). It should look like the side projection of the wing in side view Figure "B".

21. Draw in the stabilizer by projecting its leading and trailing edges from Figure "A" to the right until they intersect thrust line L Figure "B". Usually in a fuselage model the stabilizer is not placed directly on the thrust line but slightly above it. On a fuselage model it should be placed approximately 1/48 of the wing span above the thrust line. On the drawing this will be represented by ¼". Therefore, draw in a straight line between the projections of the leading and trailing edges at an angle of 1¼° to the thrust line. This represents the side view of the stabilizer.

22. Now the fin may be drawn in. This is to have an area of 12.57", and is to extend two thirds of its height above the thrust line and one third below. If it is shaped within a parallelogram 3¼" wide and 4½" high, the correct area may be obtained when the corners are properly rounded, and will give the approximate right proportion, namely, the width 1¼ times the height.

Two thirds the height is to be above the thrust line, therefore, a line parallel with the thrust line drawn 1½" above it

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and between the projections of the leading and trailing edges of the stabilizer will represent the top of the fin. A line drawn $\frac{3}{4}$ " below the thrust line and between the projections of the leading and trailing edges of the stabilizer will locate the bottom of the fin. The exact curved outline of the fin will be drawn in later when the details of the ship are worked out. The procedure now is merely to make a general layout of the structure showing the location of the parts and not the exact shape.

23. Next locate the lower side of the body directly beneath the wing. This should be $1\frac{1}{4}$ " below the thrust line. Draw a line parallel to the latter through a point $\frac{3}{4}$ " below the wing.

24. Draw in the ground line. This should be drawn parallel to the thrust line $1'$ and $2\frac{1}{16}$ " below it.

25. The wheels will be $1\frac{1}{2}$ " in diameter. Therefore, the axle will be $\frac{3}{4}$ " above the ground line, represent this on the drawing by marking a point $\frac{5}{8}$ " above the ground line on the projection of the wheel axles of Figure "A" extended. The wheels then may be indicated by drawing a circle with a radius of $\frac{3}{4}$ " using this point as a center.

Now all that remains is to lay out the front view, Figure C in Diagram 3.

26. Lay out the wing elevation, showing the dihedral. Draw in the ground line, wheels and axle line; also the propeller axis. To do the latter mark the point representing the thrust line, which will be the propeller axis. Figure C shows other details that should be included in your layout. All measurements should be inserted for ready reference. When you have completed the layout as shown in Diagram 3, the general proportions of your airplane will have been established according to the predetermined aerodynamic setup. The next step will be to determine the detailed outlines of your craft. This will be taken up in our next article.

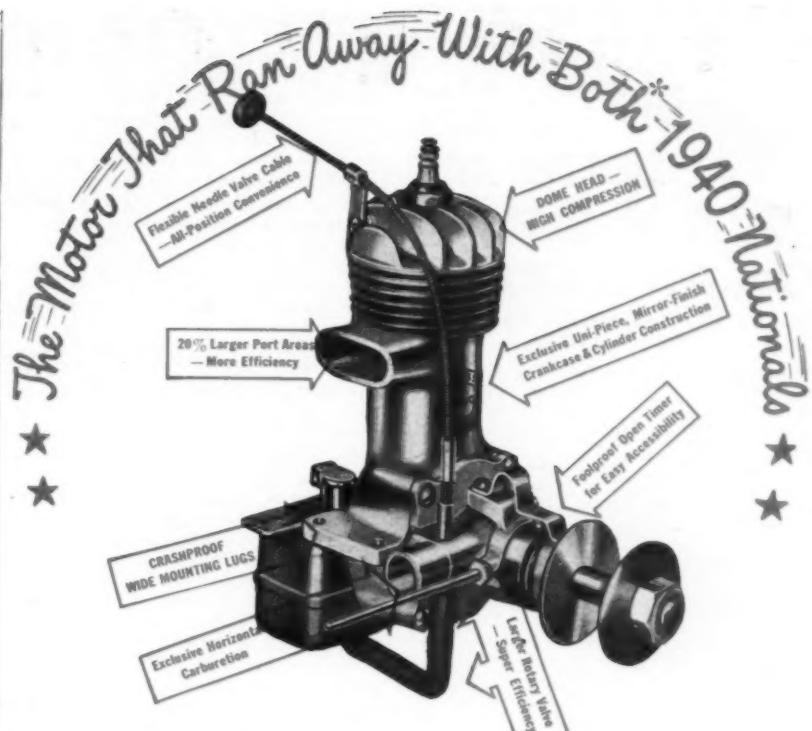
Stratosphere Contest Model

(Continued from page 27)

the drawing. When dry, lift this completed half from the drawing and glue the remainder in place. The cabin top must be glued in place before formers can be added, because they are glued to this top. When the formers are in place, the $1/8$ " square side stringers should be glued in the notches. In order that the fuselage be straight, stringers should be of equal weight and strength and glued on at the same time.

Before putting on the $1/16$ " square stringers the landing gear and rear motor anchor should be completed. The landing gear is secured with plenty of glue, gussets and silk strips. The rear motor anchor is a short length of $3/16$ " diameter aluminum tubing, which fits through the hole cut in the gussets around former N. Be sure to cut the aluminum fitting shown on Plate II to face the gussets; this adds strength and keeps tubing from pulling out.

Tubing is used for a motor anchor because a piece $1/8$ " wire may be slipped through it and used for holding the model when winding. With this method no strain is put on the fuselage when stretching



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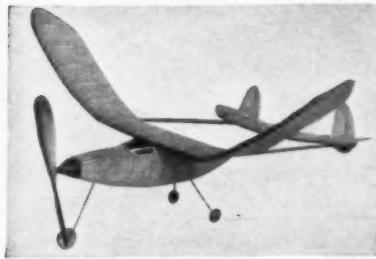
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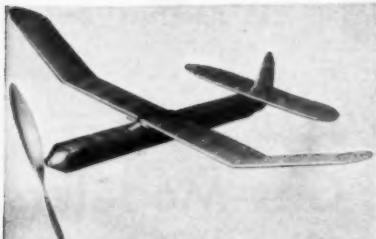
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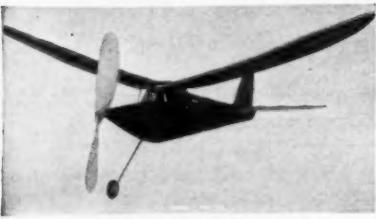
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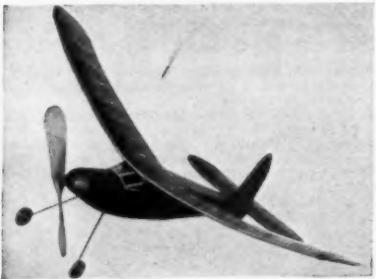
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the motor out to "pack in" turns.

Next the 1/16" square stringers and cabin covering are added. The position of the stringers is marked on the formers. Note that notches are not cut for 1/16" stringers. The cabin covering is shown half size on Plate II and will have to be scaled up. The direction of the grain is especially important to facilitate bending. When the fuselage is finished it should be sanded carefully in order to give a smooth covering.

Wing and Stabilizer

The wing has no center spars; strength comes from the 1/32" sheet covering which also prevents excessive sag between ribs. Full size airfoil sections are given on Plate II. This airfoil was developed by modifying the Gottingen 176 which has excellent characteristics at low speeds. Make a template and cut the required number of ribs. Lay out a full size drawing of the wing and stabilizer and construct them in the conventional manner. Taper the trailing edge before gluing in place. After dihedral is put in, cover the leading edge with sheet. It is advisable to sand the sheet smooth on a flat surface before applying, otherwise it will sand through at the ribs.

At the center section, the wing is covered both top and bottom with 1/32" sheet. Note that this sheet must be glued between the ribs so it will be flush with the airfoil outline. The center rib is cut flat on bottom so that a piece of 1/16" sheet, which fits the cabin top, may be glued flush with it. When this piece is glued to the center rib there will be an open space between the 1/16" sheet and the 1/32" sheet on the bottom camber. Fill this in with sheet balsa and fillet with balsa dust and dope. The wing is held in place by rubber bands stretched from two hooks anchored to the keel near the leading and trailing edges.

Stabilizer construction is so simple that no difficulties should be encountered. After it is covered it is glued firmly to the rudder and braced with 1/32" wire, shown on the front view. Note that the tab, which is soft 1/8" sheet, is hinged with thin sheet aluminum.

Propeller and Spinner

Success with any model depends largely on the propeller, therefore great attention should be given to this. Carve the blank as shown on Plate I. The approximate blade shape can be determined by the dotted lines on the blank. The blades are about 1/8" thick half-way to the tips and decrease progressively toward the tips. It is important that they are identical in shape, weight and thickness. There is about 1/8" undercamber each. Finish the prop with several coats of wood filler and glider polish with intermittent sanding.

After the prop is finished bend the folding-prop fitting to fit the curve. These fittings are lettered A, B and C on Plate II and correspond to the fittings shown on the prop details on Plate I. When these parts are glued securely in place the blade breaks should be cut. On folding props it is important to have the blades free enough to fold, but tight enough to hold their pitch. Washers should be soldered

to the rubber-tensioner spring to keep it in place. The bobbin also should be securely fastened to the prop shaft. When making the hook which fits into former A, glue in the aluminum fittings (A) well so that it will hold thrust adjustments.

The spinner is carved or turned from a block with the grain parallel to the thrust line. Finish the outside first and then cut it in half and hollow out to about 1/8" thickness. Glue the halves together and cut the completed spinner so that it fits tightly over the prop hub. When winding the spinner is removed.

Flying

On the side view the position of the center of gravity is shown; it must be in this position or slightly to the rear in order to obtain the best glide. The original ship was powered with 16 strands of 3/16" brown contest rubber. With this motor the prop run was about 1:15 minutes. On the second model 20 strands of 3/16" brown contest rubber, 32 inches long, was used. The motor run was slightly under the minute mark, but altitude attained was much greater than with the first motor. When lubed and stretched five times its length, 700 turns can be packed into the motor.

Test flights should be made with a gradual increase in turns. The model climbs and glides in right-hand circles. There should be a slight wash-in on the right wing and the tab turned slightly to the right. Be sure to put in the correct amount of right-and down-thrust.

If the model stalls check center of gravity and thrust adjustments. If it dives or glides steeply, increase the wing's angle of incidence and move the center of gravity to the rear. Due to its stable characteristics, you should have no trouble adjusting the model if your surfaces are set as directed.

Notes

The high mounted stabilizer seemed to increase the glide and spiral stability. Retractable landing gear should increase performance, but is not advised unless you have a good take-off and landing spot. If retractable gear is used be sure to fix it so that you can leave it down for test flights; it will save the covering on the bottom of the fuselage.

The fuselage was covered with strips of tissue, grain running lengthwise. The wing was covered with the grain running spanwise. After the dope was applied, a coat of glass was added to keep the tissues from tightening to the point where it pulls in stringers and causes a sag between ribs.

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The Airacobra Takes Wing

(Continued from page 13)

realistic take-offs and landings. The model, because of its snappy appearance and interesting construction, will provide many hours of enjoyment both in building and flying.

After becoming familiar with the plans and procedure of construction, you may start to build the—

Fuselage

Use of the keel pieces cut from sheet balsa simplifies the fuselage construction and aids in making the structure more accurate. Trace the top, bottom and side outlines on paper, to obtain the correct shape of the keels. Average depth of the keels is about 5/32"; lightly cement the paper patterns to 1/16" sheet balsa and then use a sharp razor blade to cut them out. The section between bulkheads No. 4 and No. 6 does not have any support at the cockpit but a curved piece conforming to the wings' shape is placed at the bottom, as shown. Bulkheads also are cut from 1/16" sheet; two of each are required. It will be noticed that only a few of the bulkheads have notches for all the stringers. Cut out the notches shown and mark the positions of the others, which will be cut later as needed.

Pin the keel pieces into position over the plan to begin actual assembly of the fuselage. Cement half the bulkheads to their respective positions; align the bulkheads accurately so they are exactly perpendicular to the keels. Attach one of the

side keels and when the cement has hardened remove from the plan and add the remaining bulkheads and the other side keel. Stringers are light-grade 1/16" square strips. As the work progresses it will be necessary to cut many of the notches for the stringers; use a razor blade that has been broken to a sharp point for this operation. Once a stringer has been attached to one side, always place one in the corresponding position on the other side, to avoid pulling the body out of line. Pieces of hard 1/16" sheet cemented between the stringers provide the anchorage for the bamboo pin that holds the rubber motor in the rear.

As indicated on the plan, the front portion of the fuselage is "filled-in" with pieces of very soft 1/16" sheet. Individual pieces of balsa are cut so as to fit snugly within the space between the formers and stringers. An exception is the several sections at the bottom into which the front landing gear fork is fitted; leave these sections open as they can be finished later. The extreme front of the nose is shaped from two pieces of 1/4" sheet that have been cemented together. As shown, the center of the nose block is cut out to receive the nose plug. Cement this nose block to former No. 1 and when dry cut and sand the entire fuselage front to a smooth shape.

Tail Surfaces

Construction of the tail surfaces is simple; both stabilizer and rudder are constructed in a similar manner. The stabilizer is built in one piece so a complete plan must be made; build directly atop the plans. Cut the outline shapes from 1/16" sheet and pin them to place over the plans. Spars and ribs are 1/16" square stock. When these flat frames are dry remove them from the plan and cement soft 1/16" square strips to both sides of the ribs; these strips are later cut to a streamline shape. Trim and sand the stabilizer and rudder to complete their construction.

Wings

The wing must be of sturdy construction since the rear landing gear struts are attached to it. Ribs are cut from 1/32" sheet with the exception of W-4 which is 1/16" sheet; two of each type rib are required. Notches for the spars and leading edge must be cut with accuracy to insure a neat job. A full-size left wing plan must be made so the parts can be assembled directly over the plans. Sizes of the various spars are noted on the plan. The 1/16" x 1/4" spar to which the landing struts are attached is not placed until the dihedral is added. The wing halves should be joined together accurately and solidly; dihedral at each tip is 1-7/8". Now attach the 1/4" deep spar and reinforce the junction necessitated by the dihedral. Trim and sand the leading and trailing edges as well as the tips to correct finished shape.

Landing Gear

The landing gear as developed for this model is not difficult to construct yet is both accurate in appearance and extremely rugged. Let's complete the front strut first. It is made from .034 music

wire. Two pieces are bent to conform to the shape shown on the plan and are then soldered together. The third wire, which braces the front fork, is shaped as shown on the side view and it, too, is soldered to place. Attach the gear to the fuselage structure by sewing the wires, using needle and thread, to bulkhead No. 2; bind the rear brace to the keel. Check for correct alignment and then apply several coats of cement. Finish the nose by "filling-in" with 1/16" sheet.

Construction of the two rear landing gear struts is also detailed; they are fashioned from .040 music wire. Two separate wires are needed for each unit—be sure to make a right and left strut. Solder the parts together and then attach them using thread and plenty of cement. Use a needle and sew right through the rib and about the wire. If properly made, this landing unit will really "take it." Rubber tubing covers and other details are not added until the model is covered.

Wheels are made from laminated discs of sheet balsa; all are 3/8" thick. Bearings should be cemented to the sides so they will revolve accurately and smoothly.

Propeller

A hard balsa block 7/8" x 1-3/8" x 7-1/2" is required for the propeller. Shape the blank as shown and then carve a right-hand prop. Cut the back face of the blades first; a bit of under-camber is desirable. The prop blades shape can be determined from the photos. Apply several coats of dope after they have been sanded smooth. Shape the spinner and then notch it to fit accurately over the propeller hub. It is advisable to use a free-wheel device to help improve the glide—hide it within the spinner. A washer is glued to the back of the prop so it will revolve freely. Color dope to a nice finish.

The removable nose plug is shown. A disc of 1/32" plywood forms the front while the back is laminations of balsa. Fix the line of thrust by cementing washers to the front and back of the plug. For the propeller shaft use .040 music wire. Place several washers between the propeller and nose plug.

Covering

To properly prepare for a neat covering job the entire frame must first be sanded thoroughly to eliminate all flaws and roughness. Our test model is colored to conform to the regular U.S. Army color scheme—the fuselage is blue, flying surfaces are yellow, details are black. Some of the real "Airacobras" are all silver in color while newest ones are camouflaged with a dull, dark color above and light color below. Colored tissue is best suited for this job since it is both attractive and light in weight. Cover the fuselage first; grain of the paper should run from nose to tail. Banana oil or thin dope is used to stick the tissue to the frames. Numerous small pieces must be used to prevent wrinkles but the individual pieces should be lapped neatly. The nose and similar parts should be covered with tissue, too. Cover the wing and tail surfaces using an individual piece for each side of each unit; grain of the paper runs spanwise. Tips, etc., require separate



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pieces of tissue also. The parts are lightly sprayed with water to tighten the tissue but are not doped until the model has been assembled.

Assembly

The various parts should now be assembled. Slide the wing into the recess between bulkheads No. 4 and No. 6; if the structure has been reproduced accurately, the incidence will automatically be correct. Check carefully for correct alignment and then cement the wing fast. Wing root pieces are cut from 1/16" sheet balsa and are fitted between the wing and fuselage. Fillets are cut from very soft 1/32" sheet. The pattern shown indicates the fillets' shape on the original model but since most models will vary a little, paper patterns should be cut to fit YOUR model exactly before the sheet balsa ones are cut. Once fillets are cemented to place, the several small openings at the junction of the body and wing should be "filled-in" with scraps of soft 1/16" sheet. Sandpaper smooth and cover the fillets with blue tissue. It will be necessary to temporarily cut the rear of the fuselage to admit the stabilizer which is attached at the exact angle shown. Offset the rudder a bit to counteract torque. Tissue fillets are placed between stabilizer and rudder. Any wrinkles in the covering should be moistened with water and permitted to dry before the entire model is given a coat of clear dope. Dope should be applied in a dry room to minimize the chance of "blushing."

Addition of numerous details completes the construction. The cockpit enclosure is made from thin celluloid. Shown on the plans is the scale shape for the windshield, but since it would be so difficult to reproduce it exactly to scale, it is recommended that the rounded section be eliminated and the enclosure be made as shown in the photos. Make paper patterns before cutting the celluloid and avoid cement smears when cementing to place. Rubber tubing of about 1/8" diameter is slipped over the rear landing gear struts. To cover the front landing strut it will be necessary to split the tubing and then cement it once it is in place; tubing of smaller diameter covers the back brace and fork portion of the front strut. Wheels are held to place by washers soldered to the rear struts—spring the fork apart to admit the front wheel. Wheel covers are cut from 1/32" sheet and covered with colored tissue to match the other parts. The stars, rudder stripes, U.S. ARMY, etc., are all made from colored tissue and the effort required in making them will be amply repaid by the snappy appearance they add to the model. Control surfaces, flaps and the door are outlined by thin strips of black tissue. Exhaust ports, wing walks and other details found on photos of the real ship can be added.

Flying

Eight or ten strands (four or five loops) of 1/8" brown rubber should be used to power this model. Lubricate the rubber and then wipe off the excess to prevent its splashing on the fuselage sides. Attach one end of the motor to the prop shaft and then drop the other end through the fuselage. It may be necessary to remove a small portion of the covering to aid in fitting the bamboo pin into position to hold the rubber strands.

Probably the most important single factor in obtaining fine flights from any flying scale model is patience. A well-built model, if properly handled, will provide many realistic flights with little or no damage to the model itself. It is important that the glide be reasonably good before any power flights are attempted; select a grassy field for these tests. Try a few shoulder-height glides and, if necessary, add a small corrective weight to the nose or tail to obtain a smooth flat glide. Try a few power turns once the glide seems okay; minor adjustments may be made by slightly warping a wing tip or the stabilizer, as the case may be, but correction for serious misadjustments should be made at the nose plug. Right- or left-thrust will control the size of circle while under power, and slight down-thrust will iron out a stall. A mechanical winder should be used for maximum flight performance.

Our "Airacobra" is not only pleasing to the eye from the standpoint of appearance but it is a capable flyer. This little ship is a stable, consistent performer and it makes a picture when in flight. You are bound to find that the distance covered is far more than might be expected for this type of ship.

Blaster of Berlin

(Continued from page 25)

longerons. The center section is also split in halves, horizontally; the portion above the wing and the portion below the wing being assembled separately. These four sections are then bolted to the wing center section.

The tail section is also split vertically down the middle and joined in halves at final assembly. Actually, this tail section is only a cantilever box beam of correct strength and weight to support tail surfaces at the required distance from the wing. All the externally-applied rivets on the Hampden are of the "dome" type, a compromise between the round-head and flat-head rivet. Actually, however, in the process of being driven, after the shank of the rivet has flattened out, the rivet hammer continues to buck the head flat so that, in finished effect, the rivet becomes a flat-head rivet with little or no drag in the slipstream.

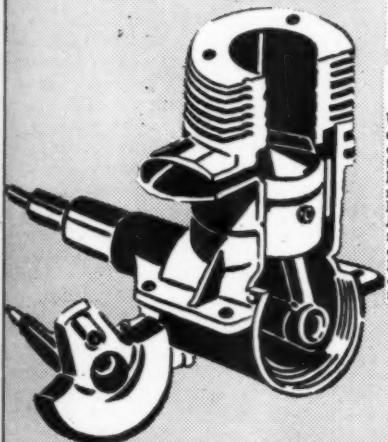
Main reason for break-down of the Hampden fuselage is that the central Handley-Page works factory is at Cricklewood in a thriving industrial district, while the Handley-Page airport is at Radlett, about seven miles away. The major components of the ship, then, must be tucked to the airport for final assembly and flight testing.

WING: The Hampden wing is actually single-spar design although auxiliary leading and trailing edge spars are employed, mainly only to carry the wing ribs and thus preserve the airfoil's contour. The main spar is divided into three sections, the main center section which passes through the fuselage center-sec-



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 3/4" bore; 5/8" stroke; .275 cu.
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 case; hardened steel timing
 cam; solid steel case hardened
 crankshaft; die cast Magnes-
 ium connecting rod; lapped
 alloy steel piston; fully equip-
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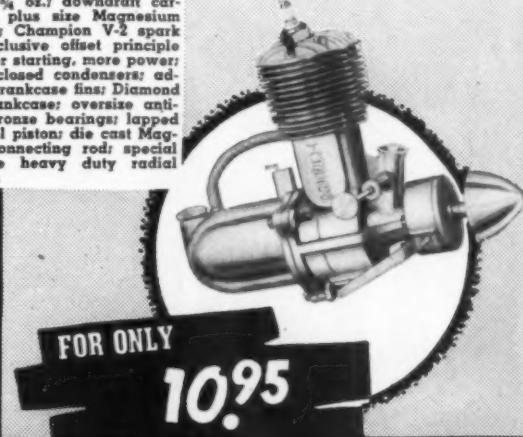
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tion in an unbroken structure and the two outer wing panel sections. The center-section spar structure is of the built-up girder type, consisting of two "T" shaped flanges with steel tubing inserts to form the girder. A "W" shaped vertical flange member is provided in the spar structure to support the landing gear trusses. The outer panel main spars are of the conventional flat-plate web with "T" section extruded flanges and cap strips along the upper and lower surfaces. The auxiliary spars are really not spars at all, consisting only of laterally-laid extruded stiffeners on the skin plating interconnected with light tubing to form a beam structure.

The ribs are also of the built-up type consisting of small "T" section extrusions moulded to contour and interconnected with small tubing of 1/2" O.D. This framework is riveted as required and over-laid with formed metal stiffeners laying laterally. Over this framework the skin is attached with the "dome" rivets previously described. A conventional flanged wing-joint angle plate is placed at each section's inner extremities through which a series of lateral bolts are placed. This bolt angle is on the inside of the wing skin making a cover-strip with its drag unnecessary. The flaps, of the trailing edge type, are hydraulically operated and controlled and are built up of formed aluminum alloy sheet ribs and a solid leading edge cover. The trailing edge is an extrusion riveted to each rib trailing edge. This framework is covered with airplane fabric.

The ailerons are of identical construction as that of the flap panels, with an adjustable booster tab in the center of each aileron panel. Aileron control is by push-rod and bell-crank throughout, there being no control cables to be shot away. The wing center section (with outer panels attached) is bolted to the fuselage at four points and attached on the main front spar.

TAIL SURFACES: The empennage of the Hampden is also assembled in a single unit and bolted to the fuselage tail section. It is the full-cantilever single-horizontal and double-vertical surface type. The horizontal stabilizer, or "tail plane" as the British refer to it, is built up on a framework of stamped metal ribs with appropriate lightening holes and beads for stiffening, laterally laid extruded sections and covered with aluminum alloy sheet riveted to the ribs and stiffeners.

The vertical stabilizers, or "fins," are of similar construction bolted by their aft spar to the horizontal stabilizer. The elevator is of similar construction to that of the ailerons and is equipped with two controllable trim tabs placed side by side at the trailing edge near the centerline of the ship. The rudders are also of similar construction and are mass balanced through the use of lead weights bolted into the balanced portion at the top. The elevator and rudders are fabric covered. The rudders have controllable trim tabs along their trailing edges. The rudder and elevator controls are also of the push-rod and bellcrank type. The rudders are interconnected with push-rod linkages which permits them to move in unison.

POWER PLANTS: The Hampden Bomber is powered with two Bristol "Pegasus" nine-cylinder, air-cooled, single-row radial engines equipped with two-speed supercharging. The Pegasus model XVIII has a take-off rating of 965 horsepower at 2,475 r.p.m. It has a maximum rating with the medium supercharger engaged of 1,000 horsepower at 2,660 r.p.m. at 3,000 feet. With the full or high altitude supercharger engaged, it has a rating of 885 horsepower at 2,600 r.p.m. at 17,500 feet.

However, it is believed that the Mark II and certainly the Mark III versions have more powerful engines; undoubtedly the Pegasus XXII engine, which has a take-off rating of 1,100 horsepower at 2,600 r.p.m.

The propellers are De Havilland Aircraft Ltd. three-bladed constant-speed all-metal designs made under license from the Hamilton-Standard Division of United Aircraft of the United States.

The carburetor air intake is located atop and slightly outboard on each engine cowl. The cowl is the famed Bristol type which features an exhaust nose ring in which the exhaust from the cylinders is roostered forward into the nose ring and thence around, down and out an exhaust tail-pipe located outboard near the bottom of each nacelle. Each cowl is equipped with hydraulically operated cooling flaps which are used to provide adequate cooling air to the engine when running on the ground or during sustained climbs or high engine speed operation.

The engine mount is the truss type in which two large beams are anchored to the main wing spar. A welded steel tubing ring and supporting tubes extend forward of this at which point the engine is attached. The oil tank, pressure fire extinguisher and battery are located in the portion of the nacelle forward of the wing. The nacelle's rear portion consists only of a streamlined fairing along the top of the wing and a large access cover on the bottom portion of the wing, to house the landing gear operating mechanism and the wheels in the retracted position.

LANDING GEAR: The landing gear and power plant are constructed in a single unit to simplify testing upon installation and assembly of the complete unit into the wing. The main gear is the truss type, consisting of two heavy-duty shock absorbers of the Vickers oleo design. The Palmer wheels are equipped with Palmer brakes which are hydraulically operated. The Vickers hydraulic landing gear system is used in which the rear support strut breaks in the middle aftward and swings the wheel up into the nacelle.

The hydraulic operating strut, or "jack" in British parlance, pulls to lift and pushes to lower the landing gear and is mounted on the rear face of the main wing spar. There are both up and down position latches to hold it in place. Two clamshell doors open and close over the wheel portion of the gear. These are located near the aft end of the nacelle and are mechanically operated by the landing gear's action moving against extending lugs on the door.

The retractable tail wheel, also man-

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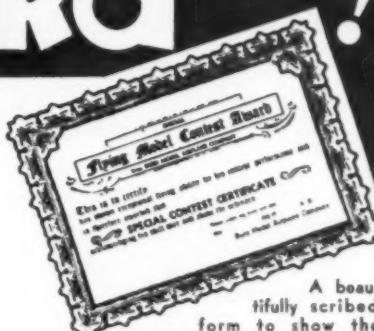
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See Page 71

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OIL SYSTEM: The oil system consists of a large aluminum oil tank mounted just forward of the main spar within each power plant compartment and having an individual capacity of 13-1/2 gallons each, or a total of 27 Imperial gallons of oil for the ship. There is an oil dilution system in each power plant so arranged that when making a cold start oil may be diluted with gasoline to lessen its viscosity and speed its flow. After entering the engine, the gasoline is burned and oil returned to the tank through the oil filter.

HYDRAULIC SYSTEM: The hydraulic system is the patented Vickers design in which two engine-driven hydraulic pumps maintain a constant pressure throughout the system of 860 pounds/square inch. There are two main hydraulic fluid reservoirs, one in each power plant, so that in the event one of them or a unit of the system is punctured and fluid lost, the damaged portion of the system may be isolated and the remainder operated with fluid from the remaining tank. The main landing gear, cowl flaps, wing flaps, tail wheel and bomb doors are hydraulically operated. Selection is by control valve levers in the cockpit.

ELECTRICAL AND COMMUNICATIONS SYSTEM: Power is taken from the engine driven generators and stored in two 12-volt lead-acid type batteries. From the batteries it is taken to the main power panel located just aft of the pilot. Then it is routed to the desired elements requiring electrical energy. Due to the Hampden's design, a large number of disconnect boxes are located at each main component of the airplane to aid assembly and dismantling. Power supply for the receiving and transmitting sets is derived from the main power panel driving a dynamo located just aft of the pilot. A retractable D.F. loop antenna is mounted atop the fuselage just forward of the upper gunner's station. The cabin is completely lighted for night-landing internal visibility and there are two landing lights of the retractable Warwick type, one in each outer panel. The bomb racks are electrically operated from a control panel on the bombing officer's table.

ACCOMMODATIONS: Although from outward appearances a small cramped ship, the Hampden has spacious quarters

for the four men of her crew; as a matter of fact, it is possible to stand erect within the fuselage. Accommodations are provided on two decks, the upper deck serving as a floor for the pilot and upper gunner, the lower deck accommodating front and rear gunners.

In the nose is the navigator-bomber completely enclosed in a spacious glass housing. It is his duty to take sights for navigation purposes aloft and direct, through readings from his bomb-sight, the dropping of bombs. He is also required to handle a forward and down-firing machine gun of the Colt-Browning .30 caliber free-firing design mounted on a special eye-socket gun mount. Above and behind him sits the pilot with the most advantageous view ever built into ANY airplane. He has guard over the instrument panel, engine and power plant controls, flight controls, fuselage heating and ventilating system (which consists of an air intake in the starboard wing and a small boiler mounted around the engine exhaust stack and supplied with water from a small header tank in the upper portion of the nacelle), the signal flare and automatic recognition device and, IN ADDITION, a fixed forward firing .50 caliber machine-gun, which is mounted on the port side of the cockpit within the fuselage.

To the pilot's rear is the gunner-radio-operator, who handles the upper rear machine-gun to ward off attacking enemy planes from this hottest of spots and in addition operates the Air Ministry Mark III transmitting and receiving radio equipment. Below him is the belly gunner who also doubles as upper gunner in an emergency and when the radio operator must be at his set.

An idea of the spaciousness of the quarters may be gained from the fact that the nose-gunner and navigator also moves to the rear BENEATH the pilot to attain his position under the celestial navigation windows located atop the fuselage just aft of the pilot's sliding hatch.

ARMAMENT: The Hampden carries an armament of four machine guns and 2707 pounds of bombs. The guns of the movable type are all .30 caliber weapons; the pilot's fixed gun is the .50 caliber type. It is believed, however, as in the case of engine power, that larger caliber guns are being installed on later models of the Hampden. Certainly, then, .50 caliber guns are used throughout, although this cannot be substantiated. The bomb load can be carried in a variety of combinations, although the usual load is made up of twelve 200-pound demolition bombs, such as were used on the recent raid on Berlin. There are 250 rounds of ammunition carried in a single container with case and link ejection chutes for the pilot's fixed gun. The front and belly gunners have 500 rounds of .30 caliber carried in containers stowed adjacent to the gun. The upper rear gunner has a supply of 100 rounds of tracer and regular .30 caliber stowed in a series of containers just under the rear fuselage cowling behind the gun station.

EQUIPMENT: For the long tiring night raids, the crew of the Hampden is

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provided with all the equipment usually found on big heavy bombers of the Wellington and Whitley types. This includes two flare racks with spare flares, spool-type aerial lavatory, oxygen supply with masks, parachutes of the quick-attachable type, automatic gyroscopic pilot, hinged foot-rest for the navigator, sextant stowage, pair of flame-floats and small personal containers for each member of the crew to stow chocolate bars, sandwiches and coffee thermos bottles as desired.

SPECIFICATIONS: The Handley-Page Hampden has a wing span of 69 feet, 2 inches and an over-all length of 53 feet, 7 inches. It has an over-all height (in flying position) of 14 feet, 11 inches; the landing gear has a tread of 17 feet, 4 inches. The fuselage is only 3 feet wide throughout! The wing has a total area of 668 square feet, a root chord of 16.29 feet and a tip chord of 3.85 feet, an aspect ratio of 6.58. The empty weight is 11,780 pounds.

It carries fuel in the amount of 3,173 pounds and 216 pounds of oil. The crew's weight is reckoned at 800 pounds and bomb load is 2,787 pounds. This gives the Hampden a fully loaded service weight (gross) of 18,756 pounds. It has a maximum permissible overloaded weight of 21,000 pounds. These loadings give it a wing loading (normal) of 28.1 pounds per square inch and a power loading (figuring normal take-off rating of the engines) of 9.77 pounds per brake horsepower.

PERFORMANCE: (Bear in mind these figures are for the Hampden Mark I, the original version of the bomber. Figures for the Mark II and Mark III, which are known to exist, will be higher due to more powerful engines.) The Hampden has a top speed of 265 miles per hour at 15,500 feet with a gross weight of 18,750 pounds. With this same weight it has a cruising speed at 2,250 r.p.m. at 15,000 feet of 217 miles per hour. The most economical cruising speed at 1,800 r.p.m. at 15,000 feet is 167 miles per hour. It has a service ceiling of 22,700 feet. It climbs to 15,000 feet in 18.9 minutes and has a sea-level rate-of-climb of 980 feet per minute. Its take-off run (clearing a 50 ft. obstacle) is 550 yards. Its landing run, under the same conditions, is also 550 yards. It lands at 73 miles per hour.

The Hampden has a range of 1,475 miles at a gross weight of 18,750 pounds, and an engine speed of 2,250 r.p.m.

The Handley-Page Hampden is, as we said at the beginning, a great compromise. Nothing has been greatly emphasized, nothing has been completely sacrificed. Greater speed might have been obtained with a far less bomb load. Greater range, too, might have been obtained under these conditions. A much greater bomb load might have been carried but with a much lower top speed. The Handley-Page engineers decided that a weight of 18,750 pounds, bomb load of 2,787 pounds and top speed of 265 miles per hour were the most advantageous and economical figures from all viewpoints. More than ONE THOUSAND Hampdens are now in service! Perhaps that compromise was a good one!

Frontiers

(Continued from page 17)

Some of the Douglas SBD-1 scout bombers now being delivered to the U. S. Navy may also be added to the air corps attack groups. Douglas may also build some B-23 bombers for England; however they now have North American to compete with, namely the B-25, to get some of the new orders that will be forthcoming from Great Britain. Just recently the U. S. Air Corps handed Douglas a new contract amounting to over \$1,000,000.

Other companies who will shortly come out with new aircraft are: Boeing, Lockheed, North American, Brewster, Vultee, Vought-Sikorsky, Martin and Pitcairn Larsen, to name a few.

With Pitcairn coming into the picture again things become interesting. The autogyro has certainly had its "ins and outs" of the industry in past years, and one company that never has given up experimenting with the rotating winged aircraft is Pitcairn. The latest creation, which has been ordered by the U. S. Army Air Corps in quantity, is a new two-place cabin ship of unusually good lines.

As far as we know it will be the first autogyro, built in this country, equipped with a rear machine gunner. The ship is also likely to be all-metal. Like former 'gyros built for the air corps, the three-bladed rotor is mounted on a streamlined turret extending from the top of the cabin between the pilot and gunner sitting in tandem. The rotor is of the tilting steering type and is self-catalyzing. In the nose appears to be an inverted Ranger engine instead of the radial engines formerly used. Another feature of the modern autogyro is the absence of wings, affording a clear downward view for the observer. A full cantilever landing gear with exceedingly wide tread projects downward with tail wheel aft. As yet the autogyro has not taken to the nose wheel. The tail has a single vertical tail surface, long and low to not only miss the surging of the rotor blades but also the fiery bullets from the observer's machine gun.

The Pitcairn will be employed by the air corps as a general reconnaissance unit accompanying mechanized divisions of the army. In this instance, only, may the autogyro claim reason for being a military weapon. In such duty, however, it will be better suited than the airplane, despite the fact some of its competitive airplanes in the reconnaissance business have been equipped with all sorts of imaginable slots and flaps. Due to its self-catalyzing characteristics it will be able to jump out of almost any field wartime activities would require. The autogyro is also able to "hang" in the air and allow the observer to take a good look at what is going on down below. Being low powered, the Pitcairn will be inexpensive to build and operate and its resulting slow speed is, in this case, a necessity to keep abreast with the mechanized army units. These ships are not apt to do much front-line work; we are skeptical if they would last very long even though they have one gunner to handle attack situations. The only front-line scouting work that would be effective, in

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our estimation, is swift darts across the line by high speed pursuit ships.

The Pitcairn outfit, incidentally, has reorganized and will be known as The Pitcairn-Larsen Autogyro Co., Inc. Mr. Agnew E. Larsen was prominent in the development of the Spenser-Larsen amphibian. Besides the U. S. Air Corps order, the British government has also ordered some planes from the company. In line with this comeback, Kellett is also in receipt of \$100,000 from the air corps for autogyro development.

Now we come to the "Vengeance"; this is probably the name the British will give the new Vultee dive-bomber that is nearing completion for them. It will put the German Stukas to shame, for it has an R-2600 radial engine in the nose which means, to those who are not familiar with the engine, that it has fourteen cylinders developing a maximum total of 1600 hp. The airplane will be similar to Vultee's three-place A-19 attack bomber in many respects, though of completely new design.

While Brewster's Buffalo, originally designed for aircraft carrier operations, will see duty with the RAF fighter command, Brewster's new and latest sensation, known as the "Bermuda," will actually join the Royal Navy's fleet air arm. The Bermuda is a two-place scout-bomber which is also on order by our own navy with an SBA-1 designation and powered with a Wright Cyclone R-2600 engine. There will be only slight differences between the English and American versions. Brewster received its first experiences with scout-bombers with completion of the SBA-1 which crashed last year after seeing considerable service. The new scout-bombers will be a very much improved offspring of the mid-wing prototype. The Naval Aircraft Factory has purchased designs from Brewster for a similar scout-bomber to be built by them and to be known as the SBN-1. This latter ship, of earlier design, will have a Wright R-1820 engine. We know Brewster is building a Model 340 bomber, but as yet have not been able to tie this in with the Bermuda scout-bomber as being the same airplane.

Many of the new Grumman Martlets are to be seen flying over Great Britain these days. They are the small mid-wing single seat fighters with the "chopped off" features and known in the U. S. Navy as the F4F-3. These planes are the first American aircraft to go into service with the Royal Navy. Being designed as shipboard fighters and of the very latest design, they should be a welcome sight to British sailors. The information that we have in our files show that the Royal Navy's fleet air arm was considerably lacking in modern aircraft equipment when the war started. Most of it appeared to be worse than anything the Italians have, which is bad. However, the "Censor" now deprives us of a large amount of late information, and thus we cannot say whether the British have modernized any further than to the extent of adding "Skuas" and "Martlets" to the naval units. But we have so many new aircraft to tell you about this month that we will save further discourse on the U. S. and Royal navies until the next

issue. We will say here, however that undoubtedly you will see Grumman twin-engined F5F-1 fighters on some of Britain's new aircraft carriers when they are built. The carriers will be named "Victorious," "Formidable," "Indomitable," "Implacable," "Indefatigable" and will weigh 23,000 tons. The British are now "dickering" for these Grumman fighters.

Photographers who have long contributed to the pages of "Frontiers of Aviation," none other than Henry Clark, W. T. Larkins, and Gordon Sear Williams, also have some of their "works" on display in the latest edition of "The Ships and Aircraft of the U. S. Fleet" by James C. Fahey. It is an excellent little publication, giving details of the navy's fighting planes. It states that both Vought-Sikorsky and Grumman are going to test hop new torpedo bombers! The airplanes, to be completed this year, will be designated TBU-1 and TBF-1 respectively . . . 286 of the Grummans are already on order. The Vought-Sikorsky will have a Pratt & Whitney R-2800 engine pumping up forward and the Grumman will be slightly smaller with a Wright R-2600 engine. Both will be monoplanes. A photo is also included in the publication of Stearman's mysterious XOSS-1 observation-scout which was built in 1938.

We claim to have been the first to let it be known that Stearman had developed a scout-observation plane for the U. S. Navy, which was soon after first test flights had been started. However, the airplane was never ordered in quantity, Curtiss getting the bulk of orders for scout-observation planes. The Stearman has been equipped as a landplane and as a seaplane with one main float and two wing auxiliaries. It is of biplane design, much the same in size and appearance as the Stearman biplane trainers. "Floating" flaps are mounted on the upper wing directly aft of the trailing edge. The pilot and observer sit in tandem in an enclosure above the fuselage.

While on the subject of our naval aircraft, Curtiss has been putting her new XSB2C-1 monoplane through its tests preparatory to beginning its first production order on the airplane. The XSB2C-1 is a fine little scout-bomber which will move into the production line where the Curtiss SBC-4 left off. In other words, there will be no more biplane scout-bombers delivered to the U. S. Navy, the monoplane now monopolizing the whole works. With Stearman on its way out of the biplane business with the adaptation of a new low-wing trainer, it appears that Waco is the only remaining upholder of the biplane, with Beechcraft a not-too-sure second among the major aircraft builders of the country. Vought and Grumman have long since discarded the biplane. The Curtiss XSB2C-1 is a compact, well-proportioned job with all the "ear-marks" of Curtiss design and construction. An excellent job has been done of cowling the apparently single-row radial engine with streamlined shrouds, enclosing the exhaust tail pipe on each side of the fuselage with their outlets shooting aft. There are no oil cooler or carburetor air intake scoops visible

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and cowling flaps are provided. The landing gear retracts inwards and flush with the lower surfaces of the wing leading edge. The plan view of the wing itself is very similar to the Curtiss P-40 with retractable automatic slots near the wing tips. The round belly of the fuselage hangs down slightly to give the plane a mid-wing effect. The crew of two sit in tandem in an enclosure which is an integral part of the fuselage. The aft end of the fuselage and tail surfaces are very much like the Curtiss SBC-4, which provides a good sturdy fuselage structure at the tail wheel and holds the rudder high as protection when hooking the cables on aircraft carriers when landing. Being a shipboard airplane, performance is somewhat limited, but, in practically every instance, it still far surpasses any scout-bomber the U. S. Navy has had in the past. It is a fast little airplane and will soon be used in large quantities by the navy, as Curtiss is now working on the first production order.

The new Consolidated PB2Y-2 patrol bomber looks good with its many modifications . . . and it will not be so very long before the first PB2Y-3 rolls off the production line, first of a large order placed by the navy. The PB2Y-2 has been considerably redesigned in that the hull depth has been increased with a well-rounded bow in place of the rotatable gun enclosure. Better streamlining has been used on the four engine cowlings. The wing now fairs into the sides of the hull instead of practically sitting on it. All in

all it makes a mighty weapon for the U. S. Fleet. While Martin completes production of their PBM-1 and starts in on their PBM-2 twin-engined patrol bombers for the navy, the company is just on the verge of supplying Great Britain with some. These will be used by the RAF Coastal Command for exploiting Herr U-boat.

We understand that Martin expects to put four Wright Tornado engines in its XPB2M-1 giant that will compare in size to the Douglas B-19. Boeing's new flying boat for the navy, the XPBB-1, which has been mentioned previously in these pages, is also likely to be powered by two "Tornado" engines developing over 2,000 hp. It will be a case of Boeing vs. Martin in a battle to get the British flyingboat business away from Consolidated. As you may know, Consolidated is now building many PBY-5 patrol bombers for Great Britain. They are named the "Catalina." It looks as though Consolidated has the four-engined patrol bomber British business "in the bag" and is now endeavoring to sell its Model 31 twin-engined boat that should give Martin and Boeing something to think about.

While on the subject of flyingboats we see that Boeing has just launched another Clipper, one of six of which three go to Great Britain. The boats will be higher powered with larger propellers that Hamilton-Standard states are of improved laminar flow design. This prevents the air from breaking away from the surface of the blade at high speed and thus gives



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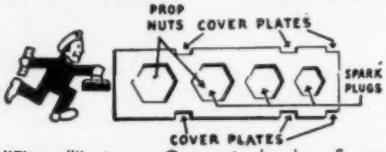
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a great deal more effectiveness to the propeller. The cross-section of a laminar flow streamlined object starts out in the usual shape of tear-drop streamlining but towards the trailing edge the sides of the cross-section take a slight reverse curve. The wings of one of our latest pursuits is designed with a laminar flow airfoil which goes a long way toward preventing stalling at the tips as well as to permit the airplane to pack away a good amount of speed.

We have not heard much from Bellanca these days; however the company is still humming. Its YO-50 observation plane is being sent through its paces by the air corps. It is in a class with Ryan's YO-51 "Dragonfly" and is what will compete against the Pitcairn-Larsen autogyro now being produced. Like the Dragonfly, the Bellanca has slots the high-wing's entirety, with an abundance of flap area along the trailing edge. In the nose is an inverted, in-line engine. The pilot and observer sit tandem in the fuselage cabin. The wing is strut braced and the landing gear is of the full cantilever "Skyrocket" type. Not a very pleasing airplane to the eye, the YO-50 has merit as a liaison airplane. Bellanca has also recently produced two new low-wing airplanes powered by Franklin six-cylinder, opposed engines of 120 hp. One is the "Cruisair" usually seen with a Ken-Royce radial engine and the other is a two-place open cockpit trainer of typical Bellanca design.

Here are some additional names for the list of American airplanes purchased by the British that was published in last

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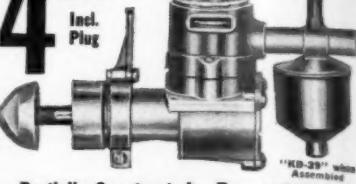
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month's issue:

Bell Airacobra P-39, "Caribou"; Curtiss P-36, "Mohawk"; Curtiss P-46, "Kit-tahawk"; Vultee dive bomber, "Vengeance"; Curtiss SBC-4, "Cleveland"; Grumman F4F-3, "Martlet"; Douglas B-18A, "Digby"; Consolidated PBY-5, "Catalina"; Vought-Sikorsky SB2U-2, "Chesapeake"; Brewster SB2A-1, "Bermuda."

Gas Lines

(Continued from page 19)

famous Junkers Ju87-A, with only a ten-inch wingspan, yet has all details included in its structure. In the cockpit are pilot and gunner. The forward hatch over the pilot slides back. There is a machine gun, which can be seen protruding from the rear cockpit. All controls are movable and may be operated from the cockpit by the joystick and rudder bar. A lever just forward of the pilot in the cockpit, when turned, releases an ejector arm under the fuselage, which in turn releases a bomb. There are machine guns and landing lights in the leading edge of the wing, as well as many other details. Froyer says this is the most completely detailed model, for its size, he has ever seen—and he should know, considering the hundreds of pictures of models he has taken.

Picture No. 5 shows a gas model of excellent design, which was built by Gerald Wolfram of 1975 Lincoln Avenue, San Jose. It has a five-foot tapered wing and is powered with a Little Dynamite, carefully cowled. The high thrust line tends to prevent stalls and the low center of lateral area makes it stable on fast level runs.

Nestor Brown Jr., of 119 Maplewood Terrace, Springfield, Mass., sends picture No. 6, showing his Stinson 105 gas model which he recently completed and entered in the display contest held at the Technical High School, where it won first prize for scale gas models. The plane has a 52-inch wing spread and weighs 20 oz. powered with a Hi Speed Torpedo. Brown is a member of a most active gas model club in this vicinity—the Springfield Torque Twisters.

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We have little news from Vermont model builders, but Tad Dietrich of 151 Ledge Road, Burlington, tells us this does not mean a lack of great activity in that state. He sends us picture No. 7 of his six-foot hydro, gracefully resting on the surface of Lake Champlain. There is nothing backward about this model—in fact, it is right up-to-the-minute in type, design and construction. Dietrich created this ship from the ground up and it has made many beautiful flights. He says:

"During the summer months Lake Champlain offers a vast flying area to gas model fans and is responsible for many designs and experiments in this territory."

The ship weighs 2 lb. 3 oz. with floats, which is extremely light, and may be flown with either wheels or pontoons. The Grant X-8 wing section is employed and it takes off with a very short run. One of the features of its construction is "L" shaped longerons, which are unusually strong and light.

If anyone would like plans for this plane, would he please write in to the editor?

Mr. Robert L. Marchant of the Exchange Gas Model Club of Denver sends us picture No. 8, showing the "snowbird" members of the Club on one of their winter flying parties. This was taken on February 2nd at their A.M.A. flying field. Marchant says that snow doesn't handicap their flying at all, making a perfect take-off and landing medium. Models take off a hard crust with great ease and if the snow is soft all one has to do is pack it down.

We have a letter from Joseph Mastrovitch of Fords, N.J., P.O. Box 127, telling us that this winter he has been experimenting with slots and has obtained unusual results. He says:

"Most slots used extend right from the wing, or flaps are used to regulate the flow of air; but I used the 'prop wash' which is forced through a channel in the fuselage up into the center of the wing, through a box spar, to both wing ends.

"At the center of lift of the chord there are openings in the upper surface through which the air is forced under the pressure of the prop wash."

Mastrovitch continues by telling us he now has completed a model with these slots ready for trials. He is using the Grant X-10 section, which has given excellent results; having made the best-time-of-the-day for Class B, at a Kresge contest held at Hadley Field. This ship had square ends, similar to the one shown in picture No. 9 in the lower right corner. This same ship placed 9th in the Nationals, Open Class; 2nd in Philadelphia, Class B and 2nd at Easton, Pa., in Class A.

The picture shows members of the Hadley Model Club; Mr. Mastrovitch is standing at the right. The model in the lower right corner has the slotted wing; however, the slots have been covered so they do not show in the photograph.

If readers wish to incorporate an efficient slot in their wings they are advised to read the article: "Slots for Models," in this issue. The slotted wing shown in the diagram has improved the performance of a test plane 100%, eliminating any possibility of stalling and making it unnecessary to adjust the plane carefully; the test plane

flew with almost any adjustment and didn't crash.

All the modelers shown in the picture have Bantam-powered Class A models; this is probably the largest single group of Class A model fliers in the country.

Donald C. Foster of 74 Warren Terrace, Longmeadow, Mass., sends us picture No. 10—the Springfield Torque Twisters. This club now has 20 members and is applying for an A.M.A. charter. There are 33 motors of all makes in the club. Mr. Exton E. Elliott, one of Springfield's first gas model builders, is club adviser. Foster says the club now is very busy trying to figure out ways to get to the Nationals. May we suggest that clubs in any particular vicinity get together and charter a bus for the trip? It is quite probable that the expense thus would be cut to a minimum.

Many classes in schools have taken up model building to supplement regular school curriculum. Without question, model building and the study of design give extra meaning to the study of algebra, geometry and physics, besides making young hands more adept at performing difficult structural operations. Algebra as algebra means nothing, but as a means of creating an airplane it has a deep significance to a young man.

Teachers are slowly but surely recognizing this very obvious fact. Incidentally, it has taken just ten years for model enthusiasts to gain recognition of this fact by a few educational departments. Apparently it is a case of being so well-versed in *old* methods that the value of new methods cannot readily be seen, and consequently are not adopted; very often pupils themselves force these changes upon teachers.

Picture No. 11, however, shows a very progressive model group. These are students of the Goshen Central School, Goshen, N.Y. The class is in charge of Mr. George McGinnis, shown in the picture as he explains details of the model's structure. The plane has a nine-foot wing-spread; powered with a twin cylinder "OK" motor. More power to this class and its progressive far-seeing instructor!

Picture No. 12 shows the finalists in the "Flight Command" contest, sponsored by the Loew's theatres in the Greater New York area. The final selection of winners and awards was made in the Aviation Terrace at LaGuardia Airport, New York City. Here you see some of the finest scale models ever created. The contest was won by a young lady, Miss Jeannette Eastman of New Rochelle, N.Y., who stands third from the right. She won with a model of the Grumman Gulfhawk, shown in the center. It embodies every detail of construction, even to an operable retractable landing gear. Second place went to Victor Codella of New Rochelle, who stands second from the left in the upper row. His model was a Grumman Twin-motor Skyrocket. Third-place trophy went to George C. Searing of New York City for his Grumman navy fighter.

The finals were held on Saturday, March 1st, and embodied over 6000 entries. Preliminary contests were held in each of Loew's theatres throughout the area; semi-finals were held in each borough, New Jersey and Westchester. The finals were con-



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Vito M. Garofalo of 1406 W. Taylor Street, Chicago, sends us picture No. 13, showing the Chicago Riser Riders. He writes:

"First row left to right, they are: Walter Savickas, Louis Bromley, Steve Obodzinski, President Henry Shapiro, and Armando Sinibaldo. Standing are: Vincent Picone, Al Kubillus, Marino Perpignani, Treasurer Vito Garofalo, Secretary Joe Limosani and Sam Baine. Jack Sheehan was absent at the time. The group appearing in the photo consists of charter members of the Chicago Riser Riders and meets every Wednesday night at the Madonna Center of this city.

"Armando Sinibaldo is the 'experimenter' of the group. At present he holds the senior ornithopter record with 2 minutes, 27.2 seconds. His previous helicopter mark of 4 minutes, 16.5 seconds was recently broken by a Bostonian, but he intends to get it back very soon. Joe Limosani 'delivers the bacon' from many local meets with outdoor stick and cabin and Walter Savickas is the city's outstanding junior, who took third place in the cabin event at the 1940 Nationals. The remainder of the club is well-known throughout the city and does its bit in placing at local and occasionally at out-of-town meets. Here's hoping we make the grade."

Greg Loucks of 5622 Miles Avenue, Oakland, Cal., sends us picture No. 14, of his beautifully detailed Curtiss Hawk. A picture of this ship, in which it was uncovered,

was shown in the January issue of Model AIRPLANE NEWS. Since then he has completed its covering, so here you see results of his labor. It took about 8 months for Loucks to complete this ship, working on it continuously.

Wisconsin

As evidence of how various model groups in the same locality can work together for the advancement of model aviation, the Cream City Gulls of Milwaukee have withdrawn application for sanction of their June 1 meet since the Wisconsin State Contest will be held in Milwaukee on June 8.

When the Gulls, who are directed by Karl Girten Sr., learned the state competition was to be scheduled one week after their meet, they agreed to cancel their competition so that their promotion and publicity would not detract from the statewide affair.

The Gulls are to be commended for their fine spirit and are soon to receive their charter as an official Academy Chapter.

Washington

Tommy Cootsona and Bill Mazzoncini write concerning the Tacoma Air Screws:

"Our first contest of the new season took place March 9th; there was an exceptionally hot battle among the contestants who turned out. At least half the models were of original design. Due however to our lack of thermals, the highest flights may seem small to Eastern modelers. Although there was a number of crack-ups, the cash awards given the high point men sent contestants, as well as spectators, home peaceful and contented on this sunny but slightly windy day. Results were:

"Cabin Event: M. Sato, Tacoma, 2:45 min.; Bill Mazzoncini, Tacoma, 2:25; Lloyd Lockwood, Olympia, 2:12. Stick Event: Charles Hollinger, Tacoma, 2:34; Bill Mazzoncini, 1:34; Don Sather, Tacoma, 1:33. Hand-Launch Glider: Charles Hollinger, 2:41; Stan Engle, Tacoma, 2:08; Art Watkins, Olympia, 1:55. Gas Event: Charles Hollinger, 2:52; Bob Winder, Seattle, 1:25; Jim Tangora, Tacoma, 1:24."

New York

Mr. H. deBolt, contest director of the Geneva Model Airplane Club, 43 Maple St., sends the following interesting report:

"Recently our modest club, composed of 25 100% A.M.A. members, received a sanction to hold an Academy record trial for all classes of R.O.W. gas models. This event will be held on Seneca Lake at Geneva, Sunday, June 1st, from 10 A.M. to 6 P.M.

"Since its conception it has received such widespread approval throughout upstate New York that the city has 'backed us up' with complete support. The local Power Boat Association will supply us with all boats we shall need and the N.Y.A. is furnishing us its seaplane float as a take-off point.

"Seneca Lake is a fairly large body of water, being 45 miles long and 5 miles wide, so we should have an ideal location for our meet.

"We did not intend awarding prizes but the local merchants wished to help us out, so there will be some very nice ones. We

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shall have trophies, motors and merchandise as prizes in all age classes for each event. The mayor has donated one of the trophies and wishes to award the prizes.

From the contest standpoint, our club has attracted all the meets held in upper New York during the past several years, so we shall do everything in our power to help the contestants. The seaplane float will be towed a sufficient distance from shore and flights will originate there. We will furnish power-boats as taxis to take model builders from the pits, which will be on shore, to the raft, and after their flight will bring them back to the pit for processing. This should work in a cycle with five fliers on the float at all times.

We want all model builders to feel they are welcome and we sincerely hope they will turn out in body. At present the pages that contain R.O.W. records are fairly blank so we would like to see some good flight-times listed on them. In any event, it should provide a lot of good clean fun as well as a way to establish records."

Pittsburgh

The First Allegheny Mountain Area Model Meet of 1941, held on the 23rd of March, attracted a great deal of interest among both spectators and contestants. Modelers from over a radius of one hundred and fifty miles were on hand to compete, with a record-breaking crowd of spectators observing the antics of the model planes and fliers.

The prayers of the Contest Director, Harry G. Vogler Jr., to the weather man

were answered and a beautiful day was the result, with about a five-mile-an-hour breeze that permitted good flights.

The winners were:

Gas Powered Open Unlimited—Franklin Hall, Meadville, Pa., 4:57.9; Dorrance Huffman, Salem, Ohio, 4:29.6; Louis Byham, Meadville, 1:58.2; Howard James, Pittsburgh, 1:53.2; Joe Cassley, Pittsburgh, 1:46.2; Thos. Ferris, Moundsville, W. Va., 1:44.6.

Fuselage Rubber-powered R.O.G.—Wm. Cahill, 2:28; Ray Caretti, 2:02; John Harrington, 1:32; Robert Korn, 1:15; Robert Breitenstein, 1:14.

Glider T. L.—Gummell, 0:52; Paul Salake, 0:49; Jack Kinzler, 0:46; Doug Moran, 0:42; Owen Niehaus, 0:36.

The meet was a great success and plans call for a number of meets under this program, which will fall under the jurisdiction of Harry G. Vogler Jr., State Contest Director of Western Pennsylvania. The next scheduled meet is May 18, at the North end of the Pittsburgh Butler Airport.

Illinois

Al Solomon of the Gas Model Aeronauts of Chicago, 2411 W. 55th St., writes:

"At a recent meeting the following officers were elected: Albert B. Solomon, president; Neil Pollock, vice-president; George Novotny, secretary; James L. Newport, treasurer. In addition, the following men were chosen for committee work: Membership: Stephen Sadlek, chairman; associates, Miles Stone and Frank

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Mus. Contest: Jerome Walter, chairman, with associates Mel Yates and Jules Carter. Experimental: Robert Kelly with associates Mel Yates and Robert Newport. Mr. Raol Hoffman remains as advisory technical director.

"While plans for the coming year remain as yet undecided, we intend to work hard for the gas model sport, to advance the science of flying models and promote good sportsmanship. To promote interest, we intend holding frequent club contests and awarding points to be accumulated for the season by the members and to determine an achievement trophy winner."

Massachusetts

Joe Walsh of 96 Willis St., New Bedford, ardent model builder, has been trying to divide his spare time between music and models; he has been playing the cornet for five years. Much of the time, he says, modeling has won out and recently he has undertaken to write a series of model construction articles for the "Standard-Times"; possibly some of you readers in this section are familiar with his work. This is another excellent example of how the model hobby will lead to something remunerative.

Connecticut

Indoor flying is now a Bridgeport reality: The Bridgeport Aeronauts meet in the state armory every Thursday evening, after which there is a flying period to improve the members' flying technique. On March 16th an outdoor contest was held; results were:

Wakefield (3 flight average): W. Sherman, 1:34.8; P. D'ostillio, 1:29.3*; B. Miller, 1:27; R. Garnett, 1:23.7; W. Wargo, 1:13. Hand-Launch Stick (3 fl. aver.): P. D'ostillio, 2:10.2*; B. Miller, 1:39*; R. Garrett, 1:33.3*; W. Wargo, 1:16.3; S. Herchick, 1:07.3. The * denotes new Club record.

This information comes from Ed Whitten of Stratford, a member of the Aeronauts.

Massachusetts

Marjorie Day of 119½ North Street, Salem, writes: "A new club was formed a few months ago, called the Witch City Gas Model Club. Officers are: Leonard Day, president; John Brennan, vice-president; Marjorie Day, secretary; Harold Colley, treasurer; Ina Brenna, Camera Girl:

"We have three members enrolled who live on the Pacific Coast and who correspond with us; they are W. G. Rich and his two grandsons. We are proud of this fact and believe we are the only club who has members on both the Atlantic and Pacific Coasts.

"We have club contests the second Sunday of each month, with regular meetings the same evening. Point standing shall be used by us until the end of the year, at which time money or prizes will be awarded the winners.

"We have limited our club to only fifteen members and our club emblems are to be a witch riding on a gas model."

Pennsylvania

Clarence Wills, president of The Terrible Torques of New Hope, sends us results of their glider contest:

"Glider-Classes A and B Hand-Launched: Clarence Wells, 43 sec.; August Schmidt, 40; George Arwine, 30. Catapult—Open to All Classes: Tomas Fresco, 2 min. 10 sec.; William Stahl, 1:50; Clarence Wells, 1:10.

"All winning ships in the Catapult Event flew out of sight and only one was found. The contest was held in a valley and exceptionally strong slope currents helped make good flights. We will hold another meet with the same events on June 8th at Mercer Airport, N.Y."

Coming Events

June 1—Davenport, Iowa—Third annual invitation contest, held by Tri-City Gas Model Club at Cram Field Airport. Events: Classes A, B, C Gas; Fuselage and Stick Rubber Powered. Prize list consists of merchandise worth \$150. A.M.A. sanction. Further details from John Loufek, 1902 Grand Avenue, Davenport.

July 27—Windsor, Ont., Canada—Annual contest held by Windsor Y.M.C.A. Model Airplane Club at large spacious field just past viaduct on Dougall Avenue. A.M.A. rules for Classes A, B, C Gas, Wakefield and Stick Events. Also Free-for-All Rubber Event. Trophies and prizes will be presented. Entry blank obtainable from Kenneth Brown, secretary, 3735 Peter Street, Windsor, Ontario, Canada.

June 1—Portsmouth, Va.—Eastern States Hydroplane Championships. Sponsored by the Moose Club and promoted by the Portsmouth Aero-Nuts. All entries must hold A.M.A. licenses. Classes are A, B, C Gas; C and D Rubber Combined. Grand prize, highest 3 flight average of day in any gas event, will be sent to the Nationals via Pennsylvania Central Airlines with meals and hotel bill paid. Value \$100. A total of \$250 will be given in cash, trips and merchandise awards. L. R. Purdy is Meet Manager.

May 17—Chaffey Campus, Ontario, Cal.—The Chaffey Union High School Aviation Club is sponsoring a contest in conjunction to Chaffey Fair. Entry blank obtainable from Eustace French, Chaffey Junior Fair.

July 13—Lancaster, Pa.—Garden Spot Model Association's fifth annual meet at Lancaster Municipal Airport. A.M.A. sanction for Classes A, B, C Gas and Combined Rubber Events. Entry fee is 50c per gas entry, 25c for rubber. Write Joseph R. Gassman, R.F.D. No. 3, Lancaster for entry blank.

July 27—Linden, N.J.—third annual New Jersey State Rubber Model Championship Meet, sponsored by the Linden Model Aircraft Club. Site of meet is old Cranford Airport, Clark Township, a few miles from Linden. A.M.A. sanction. Get entry blank from Linden Model Aircraft Club, Recreation Commission Office, Old City Hall, Linden.

June 8—Los Angeles, Calif.—Tenth semi-annual contest of Gas Model Airplane Association of Southern California. Entry blanks obtainable from W. L. Butler, Pres.

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mony presided over by Secretary of the Navy Frank Knox.

Action on construction of the eight bases leased from Britain in the famed "destroyer deal" has at last been taken and the first contingent of men and materials has been sent to each of the island fortresses. More than forty million dollars will be spent on erection of barracks, hanger facilities, landing fields and seaplane ramps and the entire program will be completed by early Fall.

A Consolidated PBY-2 twin-engine patrol bomber was assigned to President Roosevelt to fly mail and important papers to him during his recent fishing cruise off the east coast of Florida, on board the presidential yacht Potomac.

Lieut. Seymour A. Johnson, attached to the Anacostia Naval Air Station, the Navy's "Wright Field" was killed in the crash of his fast Grumman F3F-1 fighting plane on a small farm near Norbeck, Maryland. Engine failure was blamed.

Lieut. (J.G.) F. M. Robinson, Ensign Kirby L. Berry, Radioman S. K. Nyezo, Radioman J. S. McLandon, Radioman B. D. Christman and Machinist-mates M. O. Dejarnett lost their lives in the mid-air collision of two Douglas TBD-1 low-wing navy torpedo-bombers attached to the aircraft carrier Yorktown, while at sea in the Pacific Ocean.

Test Pilot W. B. Wild escaped serious injury when his North American SNJ-2 navy plane crashed against a hillside in Southern California. Testing the plane preparatory to signing it over to naval officers, Wild gave no explanation of the crash which demolished the new plane.

Tragic results of "horseplay" were in evidence when a low-flying Naval Aircraft Factory N3N-1 training plane flown by Ensigns J. L. Thompson and P. C. Brown decapitated a 35-year old mother as she vainly attempted to dodge the playful fliers. Another worker in the field narrowly escaped death and a small boy suffered a broken leg when he was knocked to the ground by the plane's tail-skid. Court-martial and imprisonment is due for the officers disgraces to the service.

A Northrop BT-1 torpedo-bombing plane took the lives of Ensign W. G. Barnes, Machinist-mates Ralph Goff and D. D. Doga with it when it crashed in the mountains behind North Island Naval Air Station in San Diego. Attached to the aircraft carrier Saratoga, the plane was on a routine training flight.

THE INDUSTRY—"The country's number one strike" was settled recently when workmen of the Harvill Aircraft Die Casting Corp. of Los Angeles, entered the plant and resumed work after a three-week layoff. No details of negotiations were released to the press but it is believed that national defense officers who intervened, compromised the demands of the workmen and Henry L. Harvill, president of the new firm which has risen to the position of "number one" subcontractor of die-castings, essential to ALL new defense airplanes.

Ground-breaking ceremonies were held recently for the new eight million dollar North American aviation factory at Kansas City, Missouri. At the same time the eight million dollar North American factory at

The Advanced CHALLENGER



John Drobshoff with his famous Class "A" Job and trophies they have won in the toughest competitions!

Let us look at the record:
Chicago Nationals — 1940 —
Air Trails Trophy Winner
—Time 32'55".
Sacramento, Calif. — Aug. 1940
—1st Place (150 contestants)
Average: 10'55".
Los Angeles, Calif. — Dec. 8th,
1940 — 1st Place (367 contestants)
Time: 12 1/2 min.

Wing Span: 51 inches. Wing Area: 290 sq. in. Weight ready to fly: 16 oz. Price complete kit only \$2.50 at your dealers. (By mail 25c extra for postage and packing.) Suitable for Class "A" motors such as Ohlsson "19", Bantam, Madewell, Perky, Megow "199", etc.

"Get in line with The Advanced Line"

ADVANCED ENGINEERING CO., Dept. M.A., 335 Olive Ave., Fresno, Calif.

Dallas was inspected and pronounced ready for installation of machinery and supplies. It is believed that 100 B-25 bombers will be turned out every month at each of the factories and 12,000 men will be needed at each of them for the job. North America's present backlog is \$201,000,000. It recently delivered the 1,000th training plane to the Royal Air Force!

Henry Ford, he of the amazing aviation announcements, recently came forth with another: plans for a flivver plane. Details: "A two-seater combining features of the ordinary airplane with the gyro-type ship, permitting it to land or take-off in a very small area. The ship will be powered with a 300 horsepower motor built horizontally into the wing. The body will be made of plastics."

Lockheed continues to report expansion, additional orders and increased production. "We are definitely on a war-footing" stated President Robert E. Gross. Production on the "Ventura," bigger, faster and more deadly model of the Hudson is well ahead of schedule, twenty having already been delivered, although four of these were sunk with the Norwegian freighter Benjamin Franklin when it met a German submarine in the Atlantic. After the completion of sub-stratosphere tests on the P-38 by Test Pilot Milo Burcham, former air-race flier (during which he was "de-oxidized" for 30 minutes before the flight) the first five are complete of the 700 for U.S.-700 for Britain order. It was recently stated by an air corps officer that all 1400 of the "Lightnings" would go to England "as we have no immediate use for such a 'hot' ship."

A Class "A" Model that has beaten the large Class "C" as well as Class "B" ships.
"A Little Giant"



EXPLORER

Complete kit \$2.95. Class B for Ohlsson "28" and other small "B" motors. STURDY-BUILT TO TAKE IT.



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25c Twin Gliders Kit
"Swallow and Sparrow"
Ready cut fuselage and wings. These Class "A" Gliders have won many contests in California—Hollywood, Bakersfield, Fresno, etc. Kit contains both gliders. Only

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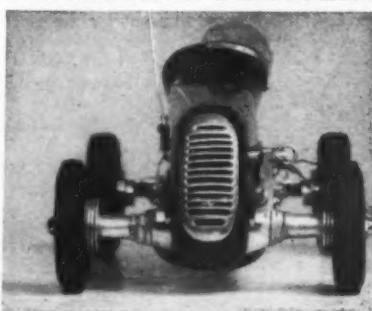
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SALE on used motors. Atom \$9.00—Midget \$8.00—Sky Chief \$4.50—G.H.Q. \$2.95—Synchro \$3.95—James \$4.50—Cyclone \$5.95—Brownie \$6.95—Brown B \$10.50—Bantam \$11.50—K Special \$6.00—Torpedo \$9.50—\$12.50—Dennymite \$8.50—GH Jr. P.P. \$9.50. Complete kit, collect and send postpaid, guaranteed. United States Model Airplane Company, 44 Oakland Terrace, Newark, New Jersey.

Lockheed backlog, including \$74,407,192 from subsidiary Vega, stands at \$296,398,000.

Walter Beech, the grand old man of aviation, whose tiny company recently boomed into the big time, states: "There is a very serious shortage of aluminum in this country and unless something is done to stop strikes we are going to be in great difficulty before this fall. I have only a 30-day supply on hand and when that is used up I don't know what we're going to do."

Manufacturing three different types of planes for the government with a fourth under test, Beech aircraft now has a backlog of \$25,000,000.

North American and Douglas Aircraft will soon receive a twin-engined Messerschmitt ME-110 fighter. The ship was recently landed in New York from London and is now en route to the West Coast for inspection by these manufacturers of a similar type. The plane, shot down in England, is well preserved and was carefully dismantled and crated.

Consolidated has broken ground for its Tulsa and Fort Worth plants. The factories will be of the "black-out air-conditioned" type which means de-centralized buildings and windowless ventilation. More than 100 Consolidated B-24 "Liberator" bombers will be produced by these two plants per month, 50 for the U.S. and 50 for England. Consolidated's present backlog stands at \$342,548,000.

Curtiss-Wright Corporation, one of the world's largest aviation enterprises, made a net profit of \$15,932,251 in 1940 and is well on its way towards doubling that figure in 1941 with an outstanding backlog of \$724,688,000, largest in the industry. Now in production are the famed P-40 fighter for the Air Corps and its R.A.F. counterpart, the "Tomahawk." Orders have even been received for the P-36 air-cooled version of the plane known as the "Mohawk" in the R.A.F. The tiny CW-21 interceptor has also been ordered. A huge order is on hand for the XSB2C-1 dive-bomber previously described. No definite commitments have been made on the giant twin-engine airliner, as yet.

Douglas Aircraft continues its expansion and stepped-up production figures with new roller-wheel assembly belts and a traveling paint shop which moves down the final assembly line painting the ships at it goes. Latest model is the 8A-6 for the Royal Air Force, a single-engine attack-bomber. More than 100 ships of all types are being produced monthly by the two divisions of the company with production scheduled to get under way in the new Long Beach division early this summer. The B-19 has been completed and is now engaged in a six-weeks intensive ground-testing preparatory to the actual test flight at the end of that period. It will be the most spectacular event in recent aviation history insofar as it is the largest airplane ever built in the history of aviation. There will be seven men aboard on the first test flight to be headed by Major Carl Cover, vice-president of the company and chief test pilot. Present backlog of the company, including two recent orders from England and the U.S. Air Corps, stands at \$468,392,000.

Congress has straightened out legislation permitting the unlimited export of 100-octane aviation gasoline to the Royal Air Force. A blanket license has been set up whereby the contract from the British Purchasing Commission acts as export license.

First of Boeing's re-designed and more powerful flying boats for Pan-American's trans-Atlantic service is completed and now in the hands of test pilot Edmund T. Allen. The remaining five will be completed at the rate of one a month. One recently took off from San Francisco bound for Honolulu with 4,406 passengers! Wait a minute, there were six human passengers—the rest were baby chicks!

Western Air Express, the nation's oldest airline, has changed its name to Western Air Lines, Incorporated.

Air Youth of America

(Continued from page 30)

James Ramsey, New York City
Jack L. Dietrich, Avenel, N.J.

CLASS V—(Gasoline-Powered Models)

Judges: Charles H. Grant (Editor of MODEL AIRPLANE NEWS)

Irwin Pock (Meet manager of National Model Airplane Championships)

Louis Garami (Veteran builder and judge)

Junior Event Winners:

Dick Bruckner, Maplewood, N.J.

Pat Petrosino, Newark, N.J.

William Passarelli, Brooklyn, N.Y.

Senior Event Winners:

Joseph Raspante, Brooklyn, New York

Victor Codella, New York City

O. W. Kopnek, Hollis, L.I.

The Aero Forum

(Continued from page 10)

the point about which all the moments of an airplane act. There is a restoring moment, but it is not set up by the c.g. by a pendulum action but by THE LIFT ACTING ABOUT THE C.G. This makes this idea that, for the 'Tight Rope Walker Reason,' a low-wing is inferior as far as stability is concerned invalid. With suitable means a stable rolling moment may be set up in a low-wing design to give it satisfactory stability; from the performance standpoint it is certainly more desirable than the parasol type.

"I would appreciate hearing your comments."

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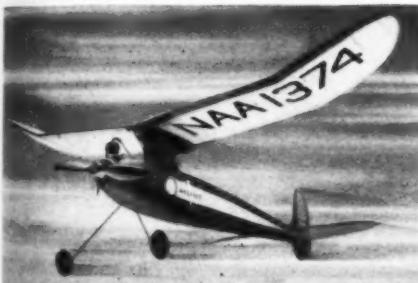
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THE MERCURY (Class "B") The gas model which took three 1st places and two 2nd places in Class "A" and Class "B" competition at the 1940 Nationals! May be used in either class by simply changing motors. Sound a design, simple in construction, an engineering triumph. Wingspan, 42 in. \$2.95 Kit No. T11.



ZIPPER "A" (Class "A") This pocket-sized performer surpasses many larger models in climb and glide. The combination of the proven Zipper design, scaled down, and the powerful little Atom motor make this an outstanding model for sport or contest flying. \$1.50 Wingspan, 32 in. Kit No. T12.



CARL GOLDBERG

Gas model wizard who designed the great Zipper and other Comet Gas Models including his latest achievement, the Sailplane. Personally conducted thrust tests on the Comet "35" Motor, which proved that no other Class "C" motor has so much power for the size.

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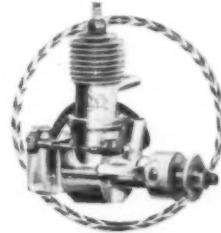
Postage on any of these models (except Sailplane) 25c; Sailplane, 50c. Order from dealer and save postage.

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(Class "C" and "B") The most popular and imitated gas model in history, the Zipper is still capturing top honors under the new rules. Astonishing climb, superb glide, exceptional stability, ease of construction. Use motors around .30 to .45 displacement for Class "C"—.23 to .299 for Class "B." Wingspan, 54 in. Kit No. T10. \$3.95

The COMET "35" GAS MOTOR

The amazing new motor Carl Goldberg says has "by far the most power for the size of any Class C motor on the market!" One sensational feature after another! Complete with Smith coil, metal-clad condenser, deluxe run-in block and Motor Manual. Postage 50c; none if ordered from dealer. \$1.295



THE SAILPLANE (Class "C") Terrific climb—1600 ft. per min. Strikingly flat glide! Consistently superb flights! Amazingly complete kit contents. Features include Propeller Saver, Retractable Landing Gear, Ignition-In-Pocket, "Automatic Pilot" wing mount. Wingspan 78 in.; total weight with motor, 3 lbs. \$5.95



THE CLIPPER (Class "C") Now, as always, a great contest performer! Simple, sturdy construction, and proven flyability make it ideal for Class "C" contest flying. Incorporates many of the newest gas model ideas. Wingspan, 72 in. Kit No. T7. \$4.95

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WIZ 8"

" 9"

" 10"

" 11"

" 12"

" 13"

" 14"

DG. 9"

" 10"

" 11"

" 12"

" 13"

" 14"

Board No. 2

Wheel Pump

Fuel Pump Can

Flight Timers

Stan. Coil

Megow Coil

Special Coil

Superlite Coil

Condenser

Competitor Coil

Aero Feather-

weight Coil

Aero Super Coil

Firecracker Coil

Board No. 3

Battery Holders

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Solderless Plugs

Banana Jacks

Banana Plugs

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Spk. Pl. Wrenches

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